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A COMPLETELY SUPPLEMENTED EVAPORATED MILK AND ITS USE AS A FOOD FOR INFANTS

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COMPOSITION

About two years ago Dr. Edwards A. Park suggested that a formula be prepared which would be successfully preserved by canning and would constitute a complete food for an infant. He stated that he had previously held the view that the addition of vitamins or vitamin preparations to the diet of an infant was preferable to the inclusion of any extra substances in the infant's basic food. He believed that the public in general could be educated to the use of supplementary vitamins in the feeding of infants.

He had abandoned this view in recent years because of the facts brought out by autopsies on infants dying in the Harriet Lane Home. These studies revealed a surprisingly high incidence of both scurvy and rickets in spite of the educational programs conducted at the children's dispensaries and well baby clinics of Baltimore on the importance of providing supplementary vitamins. He stated that he believed that efforts to educate the public to the use of the necessary supplementary vitamins had progressed as far as possible and that if the infants who still suffered from deficiencies were to be protected a basic food with the necessary vitamins added must be made available. It was on this basis that he was willing to revise his previous concept.

An impetus toward the solution of this problem was recently afforded by the need for an easily transported and easily used complete food for use in feeding large numbers of undernourished children in the rehabilitation of occupied countries. It was felt that on the basis of this need a study of such a complete formula should be carried out with dispatch.

In compliance with this suggestion there was formulated a list of supplements to be added to evaporated milk to produce a complete food for infants.

The following considerations have been kept in mind during the processs of perfecting the diet:

Sterility.—The product has been treated with sufficient heat to make it sterile; thus all possible chance of infection is eliminated.

Convenience.—The product is a liquid, the form which is of greatest convenience in preparing a formula, and it is concentrated to permit the physician to alter the feeding by adjustments in the degree of dilution.

Composition.—The product is a completely fortified evaporated milk. Details of the average composition in the form probably most suited to the needs of the medical profession are given in table 1. The contents of each can provide approximately 570 calories. Additional calories may be obtained through the use of added carbohydrates.

The average composition of the test food is shown by the following data:

	Per Cent
Moisture	74.0
Total milk solids	25.9
Protein (milk)	7.0
Fat (butterfat)	7.9
Carbohydrate (lactose)	9.0
Crude fiber	0.0
Calcium	0.2
Phosphorus	0.2
Iron	0.0024

Laboratory analysis showed the following minimum values per 13 fluidounce (14½ avoirdupois ounce) can (400 cc.; 410 Gm.).

Vitamin A	3,000 U. S. P. units
Vitamin B_1	1.0 mg. (333 U. S. P. units)
Vitamin C	50.0 mg. (1,000 U. S. P. units)
Vitamin D	500 U. S. P. units
Riboflavin	3.0 mg.
Nicotinic acid	5.0 mg.
Biotin	0.015 mg.
Pantothenic acid	3.0 mg.
Copper	2.0 mg.
Manganese	2.0 mg.

The cost of the infant-feeding study was in great measure defrayed by a grant from the John and Mary Markle Foundation.

The manufacture and assays of the food used in this study were carried out by the staff of the National Dairy Products Corp., Research Laboratories, Baltimore.

From the Department of Biochemistry of the School of Hygiene and Public Health, Johns Hopkins University, and the Harriet Lane Home of the Johns Hopkins Hospital and the Department of Pediatrics, Johns Hopkins University School of Medicine.

Each can of the product was also fortified with 0.4 Gm. of solvent extracted wheat germ oil.

TABLE 1.—*Vitamin and Mineral Content of the Test Food*

Ingredient	Calculated Amount Added per Can	Amount per Can Determined by Analysis
Vitamin A	1,500 U. S. P. units	2,480 U. S. P. units
Vitamin D	500 U. S. P. units	500 U. S. P. units
Vitamin B_1	1,000 micrograms	1,070 micrograms
Vitamin C	120 mg.	86 mg.
Vitamin B_2	1,500 micrograms	3,600 micrograms
Biotin	None	15.2 micrograms
Pantothenic acid	None	3,083 micrograms
Iron	10 mg.	9.3 mg.
Copper	2 mg.	4.4 mg.
Manganese	2 mg.	1.23 mg.

Keeping Quality.—The product has been found to remain unchanged for six months, the average shelf life of most proprietary products. The average composition given in table 1 is that found at the end of this period.

Preservation of Vitamin C.—Since vitamin C is the most easily destroyed of all the ingredients, a special table is attached to show the rate of destruction of this vitamin during storage (table 2). A table is also presented to show the content of vitamin C in a typical formula made by diluting the concentrated food with water and storing it for twenty-four hours in a refrigerator, a custom practiced by almost every mother (table 3).

TABLE 2.—*Data Showing Influence of Storage at Room Temperature on Vitamin C Content of a Food for Infants, Manufactured under Commercial Conditions*

	Vitamin C per 13 Fluidounce (14⅓ Ounce) Can by Titration		
		Stored at Room Temperature	
Sample Number	Freshly Made (1 Week After Preparation) Mg. per Can	Time of Storage, Months	Mg. per Can
3	101	3	93
11C30	100	4	95
1011	62	12	57

The analytic methods used for the determination of the amounts of various vitamins in the baby food were as follows: For the determination of vitamin A the extracted oil was examined in a Bills and Wallenmeyer electronic photometer which had been previously standardized with U. S. P. reference cod liver oil.[1] The content of vitamin C was determined both biologically,[2] as a preventive of symptoms of deficiency in guinea pigs, and chemically by titration with 2, 6-dichlorophenolindophenol. The method of Bessey and King[3] was used for titration except that a mixed solution containing 10 per cent acetic acid with 4 per cent phosphoric acid was used instead of trichloroacetic acid. The yeast fermentation method described by Schultz, Atkin and Frey[4] was used for thiamin and microbiologic methods were used for the determination of the contents of riboflavin,[5] nicotinic acid[6] and pantothenic acid.[7] Vitamin D[8] was assayed by the U. S. P. method modified for testing milk.

TABLE 3.—*Vitamin C Content of a Typical Formula Made from the Test Food*

Sample No.	Description of Sample	Vitamin C by Titration, Mg. per		
		Freshly Prepared	After 6 Hr. at 40 F.	After 24 Hr. at 40 F.
1	Infant food undiluted; can opened and product stored in bottles	148	134	131
2	5 fluidounces (148 cc.) infant food, 6 fluidounces (177 cc.) water * and 1 tbsp. corn syrup (15 cc.)†, mixed and bottled cold	60	56	52
3	5 fluidounces infant food, 6 fluidounces water* and 1 tsp. sugar (5 cc.), mixed and bottled cold	68	63	54
4	Same ingredients as no. 2, but mixed and bottled hot and cooled to 40 F.	75	70	66

* Tap water, boiled and cooled.
† Blue Label Karo Syrup.

PRACTICAL USE

The purpose of this study was to demonstrate that a complete food for infants such as this

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8. Skinner, W. W., and others: Official and Tentative Methods of Analysis of the Association of Official and Agricultural Chemists, ed. 5, Washington, D. C., The Association, 1940, pp. 282-286.

ribed in the first part of this paper would port normal growth and development and ld prevent vitamin deficiencies in infants.

perimental Subjects.—One hundred and one healthy ts up to 2 months of age were chosen for study. his number 83, 82 per cent, remained under satisry observation for a period sufficiently long to y classification of their records as complete.[9] nty-five of these were provided by the well baby s of the Bureau of Child Hygiene of the Baltiy City Health Department and the Babies Milk Association and 5 by a home for orphans; 3 private patients. There were 49 white and 34 ro subjects. Forty-four were boys and 39 were girls. youngest infant in the series began to take the food during its first week of life. The study was continued for any infant who had attained the age months. Clinics were chosen in a variety of nborhoods so as to provide a fair cross section of omic levels.

rocedure.—It was originally planned that throughthe period of study the subjects should receive the test food with added carbohydrate. This plan carried out until the infants reached the age of onths, when it became obvious that the mothers ld be greatly tempted to add solid food of some against advice. It was felt that the addition of ain, bleached cereal, free of supplementary vitamins, his time might discourage the promiscuous use of r foods. All tests for the components of the min B complex were carried out before it was d to the diet. This policy had favorable results. he test food was distributed in cans containing 13 ounces. The feedings provided from 50 to 60 ries per pound (about 120 calories per kilogram) day. The amount of carbohydrate added, in the n of cane sugar or corn syrup, varied between 5 and r cent of the total bulk of the formula. This was mplished by the addition of approximately 1 ounce Gm.) of sugar or of syrup for each 6 to 8 ounces to 235 cc.) of the test food. The carbohydrate supplemented rather than included in the test food. s was done, first, because it was felt that the food d be considered complete without this added carborate and, second, because if added carbohydrate ld be desired it could be supplied as a supplement in ntities calculated to produce the protein-carbohydrate o suitable for the individual infant. The ratio of food ater varied from 1:1 to 1:2. Thus, within certain nite limits, variations to fit the needs of the indial baby were allowed. The administration of any lementary vitamins was specifically forbidden. In 1 instance did the amount of test milk used daily ed the content of a can (13 fluidounces). The pur of limiting infants to one can a day was mainly to plify the problem of distribution, but the limitation served to standardize the quantity of food coned.

9. The records of 18 of the 101 infants accepted for y were discarded, in 7 instances because of poor eration or the proof that the parents were unble and in 7 because the families of the infants the city during the first few months of the study. o infants were fatally burned after only two months bservation; 1 infant died of pertussis early in the od of study, and 1 infant had pneumonia complicated empyema during the first two months of study and excluded from the group to be studied because of extended course of the illness.

The babies were examined by the same physician at monthly intervals or more frequently when it seemed advisable. Weights and detailed measurements were taken.

The study was carried out over a period of one year. The plan called for a six month period of observation for each subject; however, 1 infant was studied for only three and a half months and 5 infants for four and a half months. In these instances complete roentgen and clinical studies were obtained. The remaining 77 infants were followed for not less than five months. The longest period of observation was eight months, and the average period of study for the whole group was five and eight-tenths months.

Attempted Safeguards: In any study of this kind the questions arise, first, whether the infants actually received the recommended food and, second, whether additional foods and vitamin-containing substances were administered. In this study an attempt to approximate total cooperation within the limit of human possibilities was made in the following manner:

A full time, trained social worker gave her undivided attention to the close supervision of the subjects. Each infant was examined and the parent questioned by the physician at intervals of four weeks or less. The social worker visited the home or otherwise made contact with the family at a time midway between the visits to the clinic. Each infant was chosen after a full inquiry into the economic status and reliability of the parents, the nature of the home conditions and the general environmental factors. An effort was made, apparently with success, to establish good rapport between the social worker and the family. The worker rendered assistance in ways not directly connected with the study.

Cans of food were supplied in lots sufficient for two weeks only, and the parent was thus brought back to the clinic for more frequent contact with the worker, who personally distributed the food. Printed material emphasizing the requirements of the study was distributed. The saving of expense was pointed out. Each parent was assured that the food contained adequate vitamins and that additional vitamins would be excessive.

Results.—In the opinion of the examiner and of all other observers the subjects thrived and constituted a group of robust and vigorous infants. Even those who when first seen presented unfavorable nutritional features did well. No clinical evidence of any vitamin deficiency was observed. The feedings evidently were palatable and were well taken.

WEIGHT[10]: The average weight of 80 infants at 5 months of age was 15.6 pounds (about 7,000 Gm.) (standard, 15.6 pounds). At 6 months the average for 70 infants was 16.9 pounds (about 7,700 Gm.) (standard, 16.5

10. The standards for comparison of weight and height are taken from the tables computed by Dr. W. C. Davison in The Compleat Pediatrician, ed. 4, Durham, N. C., Duke University Press, 1943. These figures were compiled from a number of sources, including The Growth and the Development of the Baby by Morris Stark, Endocrine Medicine by William Engelbach and the Weight-Height-Age Tables of the Bureau of Education, Department of the Interior, Washington, D. C.

pounds [7,485 Gm.]). At 7 months the average for 43 infants was 18.0 pounds (8,200 Gm.) (standard, 17.6 pounds [8,000 Gm.]). For 16 infants 8 months of age the average weight was 18.9 pounds (8,570 Gm.) (standard, 18.75 pounds [8,500 Gm.]).

The average gain in weight for 78 infants from birth to the age of 3 months was 7.9 ounces (225 Gm.) per week (standard, 7.75 ounces [220 Gm.]). The average for 80 subjects during the second trimester was 5.4 ounces (150 Gm.) per week (standard, 5.0 ounces [140 Gm.]). For 22 subjects during the third trimester, between the ages of 6 and 9 months, the average gain was 4.3 ounces (120 Gm.) per week (standard, 3.25 ounces [95 Gm.]).

HEIGHT[10]: Measurements were taken at monthly intervals, but only those made when the infants were 5 and 6 months of age are presented. Seventy-six babies measured at 5 months had an

TABLE 4.—*Weight and Height of Subjects*

	Number of Subjects	Average for Subjects Studied	Normal Values
Weight at 5 months.....	80	15.6 lb.	15.6 lb.
Weight at 6 months.....	70	16.9 lb.	16.5 lb.
Weight at 7 months.....	43	18.0 lb.	17.6 lb.
Weight at 8 months.....	16	18.9 lb.	18.75 lb.
Average gain, 0-3 months....	78	6.9 oz. per wk.	6.75 oz. pr wk.
Average gain, 3-6 months....	80	5.4 oz. per wk.	5.0 oz. pr wk.
Average gain, 6-9 months....	22	4.3 oz. per wk.	3.2 oz. pr wk.
Height at 5 months.....	76	25.8 in.	25.0 in.
Height at 6 months.....	71	26.2 in.	26.1 in.

average height of 25.8 inches (65.5 cm.) (standard, 25.0 inches [63 cm.]). Seventy-one infants at the age of 6 months had an average length of 26.2 inches (66.3 Gm.) (standard, 26.1 inches [66.1 cm.]).

HEMOGLOBIN: The amount of hemoglobin, determined by the Sahli method, in the blood of 18 subjects averaged 11.5 Gm. per hundred cubic centimeters.

ROENTGENOGRAMS: Roentgenologic studies were completed for 75 of the 83 subjects, and in no instance was any evidence of rickets or scurvy demonstrated. The diagnoses presented by the roentgenologists were reviewed by Dr. E. A. Park and by the physician conducting the study.

SERUM CALCIUM: Determinations of the serum calcium carried out by the method of Kramer and Tisdall for 42 infants in the last month of the period of study gave an average of 10.2 mg. per hundred cubic centimeters. The normal figures generally quoted lie between 9.0 and 11.0 mg. The highest value was 13.7, the lowest 8.3 and the second lowest 9.0 mg.

SERUM PHOSPHORUS: The average of determinations of serum phosphorus by method of Fiske and Subbarow was 7.0 mg. hundred cubic centimeters. The gene quoted normal lies between 5.0 and 6.0 The highest value was 8.8, the lowest 3.9 the next lowest 5.2 mg.

SERUM PHOSPHATASE: Determinations of phosphatase activity of the serum of 42 in by a modification of the method of Boda gave an average of 17 Bodansky units hundred cubic centimeters. The results va widely and seemed to bear no definite rela ship to the levels of calcium or phosphoru to the roentgenographic appearances.

VITAMIN C: Determinations obtained fo infants by the method of Mindlin and Butl gave an average of 0.88 mg. of vitamin C hundred cubic centimeters of blood. The hig value was 1.33, the lowest 0.41 and the lowest 0.51 mg. The normal range accor to Dr. Laslo Kajdi, who performed the t lies between 0.5 and 1.0 mg. A higher ave figure, in the neighborhood of 1.0 mg. hundred cubic centimeters, was anticipated the last 8 specimens were presented. The va for this entire group were considerably lo than the previous average but were well wi the normal limits. Dr. Kajdi suggested that deviation might well have been due to an e in the method of determination.

VITAMIN A: Tests for carotene and v min A in the blood were carried out by Josephs modification of the method of Cla and McCoord.[12] The average of 16 determi tions of vitamin A was 96 units per hund cubic centimeters (normal 50 to 150 units). greatest value was 155 and the lowest 60 u

THIAMINE: Twenty-nine analyses of the u for thiamine by the method of Hennessy Cerecedo[13] gave an average of 13.6 microgr (normal 0.06 to 10.0 micrograms) per hund cubic centimeters. The highest value was 3 the lowest 0.63 and the second lowest 5.3 mic grams.

RIBOFLAVIN: For 9 specimens of u analyzed by the fluorometric method of Najj

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average of the results was 64.5 micrograms riboflavin per hundred cubic centimeters rmal 2.0 to 15.0 micrograms). The highest ue was 155.0, the lowest 3.3 and the second est 25.6 micrograms.

These values in particular, as well as those for er components of the vitamin B complex, are sidered to be high.

F_2 (N-methylnicotinamide derivative): By a dification[15] of the method of Najjar and ood,[16] determinations were made of the ounts of the derivative of nicotinamide de- ibed by the author in the urine of 10 subjects. e average excretion of F_2 expressed as N- thylnicotinamide chloride[15] equaled 266 micro- ms (normal 34 to 350 micrograms) per hun- d cubic centimeters. The highest was equiva- t to 838, the lowest to 62 and the second est to 82 micrograms of N-methylnicotin- ide chloride.

Acute Illnesses and Other Modifying Factors. t was felt that the 22 acute illnesses which curred in the 83 infants were tolerated well. e use of the test food was continued through- t the illnesses. Diarrheal episodes of short ration were observed in 12 infants and in prac- ally all instances were shown to be related to renteral infection. Seven infants had pneu- onia; 5 had purulent otitis media; 4 had rtussis; 3 had generalized furunculosis; 2 had ickenpox and 1 had measles. Constipation of y severity was infrequent and responded dinarily to the administration of prune juice, hich was permitted. An almost unprecedented riod of extreme heat during the last two onths of the study (June and July, 1943) ndoubtedly affected the average gain in weight. he infants at the home for orphans were par- ticularly beset by acute infections. The question of separating these figures from those of the main study, as invalid, was considered, but this was not done.

PREMATURE INFANTS

No premature infants were studied. The test food contained an inflexible proportion of vitamins, and in view of the relatively small amount of food required by small premature infants it was felt that this type of feeding unless supplemented by the administration of additional vitamins was not to be recommended.

TREATMENT OF SCURVY

One infant of 10 months with active scurvy was treated by the administration of the test food alone, in the usual quantities. Clinical improvement was observed in two to three days. Roentgenologic evidence of healing was noted at the end of one week, and advanced healing was observed at the end of the second week.

TABLE 5.—*Chemistry of the Blood and Urine*

	Number of Determinations	Average for Subjects Studied	Highest Value	Lowest Value	Second Lowest Value	Normal Values
lcium, mg./100 cc. of blood	42	10.2	13.7	8.3	9.0	9.0-11.0
osphorus, mg./100 cc. of blood	44	7.0	8.8	3.9	5.2	5.0- 6.0
osphatase, Bodansky units/100 cc. of blood	42	17.0	65.5	2.6	8.0	5.0- 7.0
amin C, mg./100 cc. of blood	43	0.88	1.33	0.41	0.51	.....
amin A, units/100 cc. of blood	16	96	160	60	65	50-150
iamine, mg./100 cc. of urine	29	0.0372	0.0668	0.0021	0.0106	0.002-0.020
oflavin, mg./100 cc. of urine	9	0.135	0.310	0.0066	0.0512	0.005-0.060
as N-methylnicotinamide chloride, mg./100 cc. t urine	10	0.266	0.868	0.062	0.082	0.034-0.350

SUMMARY

Eighty-three infants received a test food consisting of complete, supplemented evaporated milk for an average of six months. The infants thrived, and the weights and measurements for the group compared favorably with accepted standards. No clinical or roentgenologic evidence of vitamin deficiency was observed, and chemical analyses of the blood and urine gave no indication of vitamin deficiency. The normal processes of digestion and elimination were not disturbed in any discernible manner.

CONCLUSIONS

It is concluded that the test food described is a suitable complete food for infants for at least the first nine months of life, that this food will support normal growth and development and that it will prevent vitamin deficiency.

The food is well adapted to transportation, storage and distribution.

Miss Anice Sampson contributed to this study in her capacity as the social worker.

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BACTERICIDAL ACTION OF PENICILLIN ON BACTERIA COMMONLY PRESENT IN INFECTIONS OF URINARY TRACT

WITH ESPECIAL REFERENCE TO STREPTOCOCCUS FAECALIS

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Since the advent of chemotherapy in the management of infections of the urinary passages, several milestones in its progress can be marked. As recently as 1895, when Nicolaier first instituted the use of methenamine for patients with such infections, the treatment consisted of alkalization when the urine was acid and acidification when it was alkaline. In 1931, the ketogenic diet was introduced, and betaoxybutyric acid produced physiologically by the body gave urine definite bactericidal properties when its acidity ranged between p_H 5 and 5.5. The difficulty of management and the lack of economy of the ketogenic diet have been obvious, and Rosenheim's introduction of mandelic acid in place of betaoxybutyric acid was a great step forward. However, mandelic acid in large amounts is likely to cause digestive upset and occasional hematuria. Furthermore, when the kidneys are damaged or when the infection is one of those producing a persistent strongly alkaline reaction of the urine, the necessary concentration of the organic acid or a sufficiently low p_H or both cannot be reached, and the effectiveness of mandelic acid is thus limited. With the introduction of sulfonamide compounds urinary antisepsis became greatly simplified. In concentrations that can be easily reached in urine, sulfonamide compounds prove bactericidal for all bacteria found in persons with infections of the urinary passages with the exception of Streptococcus faecalis. For the latter an acidity of p_H 5.5 or less in urine has to be maintained if any efficacy is to be expected. Thus if a patient with infection of the urinary passages due to Str. faecalis has damaged kidneys and therefore cannot excrete urine with a sufficiently low p_H value, therapy with a sulfonamide compound is ineffective. It was with this type of patient in mind that we undertook to determine the effect of penicillin on Str. faecalis in urine.

Relatively little work has been done on the effect of penicillin on Str. faecalis, particularly on strains isolated from persons with infections of the urinary tract. Bornstein [1] stated that all his 27 strains of enterococci proved to be resistant to penicillin in a concentration of 8 of units per cubic centimeter of broth. Fleming [2] his original article placed the resistance of Str. faecalis to penicillin in the same category as that of the colon-typhoid group of gram-negative bacilli. McKee and Rake [3] put Str. faecalis in the group with Friedländer's bacillus, Salmonella and Aerobacter aerogenes, which they found also not susceptible to penicillin. Fisher,[4] in an extensive report on antibacterial properties of crude penicillin, labeled 5 strains of alpha Str. faecalis as the resistant organisms. Furthermore, we cannot as yet find, in a search of the literature, any detailed study of the bactericidal action of penicillin on bacteria commonly present in urinary infections of the urinary passages, including the gram-negative bacilli as well as Str. faecalis and Staphylococcus aureus.

METHOD OF STUDY

We had available for study 30 strains of Str. faecalis, 13 strains of Proteus ammoniae, 39 strains of Escherichia coli, 18 strains of A. aerogenes, 3 strains of Pseudomonas aeruginosa and 11 strains of Staph. aureus. All these organisms were originally isolated from urine of patients with infections of the urinary tract. The stock cultures were kept on agar slant at a temperature of 4 C. The 2 samples of urine used in the experiments were collected from patients receiving penicillin for coccic infections and contained 30 and 1 Oxford units per cubic centimeter respectively. The urine was Seitz-filtered, and a test for sterility was carried out on the filtrate before each series of experiments.

* Section on Pediatrics, the Mayo Clinic.

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each experiment a fresh twenty-four hour culture ach organism in a special brain broth was em- ed. The reaction was adjusted to p_H 7.6. This al brain broth had the advantage of giving a rich uniform growth throughout the tube to all the non organisms on incubation at 37 C. for twenty- hours. Five cubic centimeter portions of the les of urine were pipetted into the sterile test s. Only a minute quantity of the special brain culture of each organism was used to inoculate ample of urine by dipping an average-sized platinum into the broth culture to a depth of 4 mm. The was thoroughly shaken and the urine sucked up the pipet repeatedly, and 0.5 cc. of the inoculated was immediately plated with warm agar, as little as possible being left between the inoculation and plating. These plates were incubated for twenty- to forty-eight hours; at the end of the period of bation the colonies were counted, and the numbers recorded in the tables herein presented, in the mn headed "Immediately After Inoculation." The ulated samples of urine in the test tubes were incu- d at 37 C. for twenty-four hours. After twenty-four s' incubation, 0.5 cc. of the urine was again removed the test tube and was plated with agar. The was likewise incubated for twenty-four to forty- t hours. The number of colonies counted on each then was entered in the column "After Twenty- rs Hours' Incubation" in the tables. When the count eded 20,000 colonies per plate, it was put down as umerable."

RESULTS

Str. Faecalis.—Table 1 shows that urine taining 4 Oxford units of penicillin per cubic

LE 1.—*The Effect of Penicillin on Six New Strains of Str. Faecalis with Respect to Amounts of Inoculation of Organisms into Urine Containing 4 Oxford Units per Cubic Centimeter*

	Number of Bacteria in 0.5 Cc. of Urine			
	Light Inoculation		Heavy Inoculation	
Strain	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation
A1	3,790	40	12,000	1,560
A2	5,985	123	Innumerable	6,240
A3	2,330	24	11,220	15
A4	598	5	1,200	13
A5	1,463	3	4,980	2
A6	3,125	24	12,300	4

timeter had definite bactericidal effect on 6 hly isolated strains of Str. faecalis. With tine relatively light inoculations the reduction from thousands of bacteria per 0.5 cc. of ne immediately after inoculation of the or- ism to 123 or less per 0.5 cc. of urine after nty-four hours' incubation. When the in- lations consisted of single loopfuls of the brain th culture of the organism, the final counts of teria were also sharply reduced.

As is shown in table 2, there was consider- e reduction of the numbers of bacteria after nty-four hours' incubation at 3 units per ic centimeter. There were slight inhibition 3 of the 6 strains at 2 units per cubic centi- ter and marked growth of the other 3 strains. At 1 unit per cubic centimeter there was marked growth of all the strains.

With concentrations of 30, 15, 8 and 6 Oxford units of penicillin per cubic centimeter of urine there were a marked reduction of the number of

TABLE 2.—*The Effect of Varying Lower Concentrations of Penicillin on the Inhibition of Growth of Str. Faecalis*

	Number of Bacteria in 0.5 Cc. of Urine					
	3 Oxford Units per Cc.		2 Oxford Units per Cc.		1 Oxford Unit per Cc.	
Strain	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation
A1	4,680	137	2,640	Innumerable	1,600	Innumerable
A2	9,120	900	7,680	Innumerable	5,700	Innumerable
A3	2,400	52	1,560	Innumerable	1,100	Innumerable
A4	228	4	480	9,300	50	4,200
A5	1,500	90	630	3,240	1,020	Innumerable
A6	5,100	33	1,020	2,640	2,220	Innumerable

bacteria in the first six hours of incubation in all dilutions and a comparatively small reduction in the next eighteen hours (table 3). This result agrees with the findings of Hobby, Meyer and Chaffee [5] in their studies on penicillin. They found that there is a geometric decrease

TABLE 3.—*The Effect of Varying Higher Concentrations of Penicillin in Urine on Inhibition of Growth of Str. Faecalis*

	Number of Bacteria in 0.5 Cc. of Urine							
	30 Oxford Units per Cc.		15 Oxford Units per Cc.		8 Oxford Units per Cc.		6 Oxford Units per Cc.	
Strain	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation
A1	1,260	0	3,600	2	4,250	2	Innumerable	11
A2*	3,300	2	Innumerable	108	Innumerable	280	Innumerable	58
A3	1,800	0	1,250	3	2,300	3	3,210	2
A4	2	0	19	0	22	13	226	0
A5	600	2	606	0	1,800	0	1,350	0
A6	3,780	3	4,200	42	5,400	33	Innumerable	5

* After six hours showed 480 colonies in urine containing 15 units per cubic centimeter, 720 colonies in urine containing 8 units per cubic centimeter and 1,380 colonies in urine containing 6 units per cubic centimeter.

of the number of bacteria with an arithmetical increase of time.

As is recorded in table 4, 24 old strains of Str. faecalis were tested with penicillin in a con-

5. Hobby, G. L.; Meyer, K., and Chaffee, E.: Observations on the Mechanism of Action of Penicillin, Proc. Soc. Exper. Biol. & Med. **50**:281-285 (June) 1942.

centration of 4 Oxford units per cubic centimeter of urine. There was a marked bactericidal effect on all of them but no complete killing off of any of these strains, although counts as low as 2, 9 and 13 per 0.5 cc. of urine were observed after twenty-four hours' incubation when the initial inoculations were 660, 1,380 and 480 Oxford units per 0.5 cc. of urine

TABLE 4.—*The Effect of Penicillin in Urine (4 Units per Cubic Centimeter) on 24 Old Strains of Streptococcus Faecalis*

Strain	Number of Bacteria in 0.5 Cc. of Urine	
	Immediately After Inoculation	After 24 Hours' Incubation
4	2,520	660
6	6,300	420
10	1,380	9
11	3,600	84
12	2,520	82
14	3,720	100
15	2,400	40
21	2,760	540
22	4,320	288
23	660	2
24	2,580	116
25	2,820	180
26	1,080	156
27	3,240	48
28	900	27
29	2,340	90
30	1,080	27
31	3,900	57
33	480	13
34	3,720	360
35	9,000	89
36	4,860	120
37	3,660	36
38	3,120	109

respectively. In view of the low level of 3 units per cubic centimeter at which Str. faecalis is markedly reduced in number, the higher concentrations of penicillin that can easily be reached in the urine and the presence of the natural defense mechanism of the human organism, it would seem that penicillin should prove useful in combating this infection in clinical cases.

2. *P. Ammoniae.*—Our conclusions on P. ammoniae were in agreement with those of Florey and his co-workers [6] in that this organism pro relatively vulnerable to the action of penici As is shown in table 5, at a concentration o Oxford units per cubic centimeter of urine th was bactericidal effect on all 13 strains. A twenty-four hours there was no growth

TABLE 6.—*The Effect of Penicillin on 39 Strains Escherichia Coli in Urine Containing 30 Oxford Units per Cubic Centimeter*

Strain	Number of Bacteria in 0.5 Cc. of U	
	Immediately After Inoculation	After 24 Hou Incubatio
1	2,100	0
2	5,700	Innumerabl
3	5,760	1
5	3,540	144
6	5,400	Innumerabl
7	4,200	Innumerabl
8	5,220	Innumerabl
9	7,920	134
10	5,100	Innumerabl
11	3,300	Innumerabl
12	3,240	Innumerabl
13	1,500	0
14	3,000	42
15	3,780	0
16	3,960	Innumerabl
17	3,960	9,000
18	2,520	Innumerabl
19	2,960	0
20	4,200	44
21	6,420	Innumerabl
23	4,020	123
24	5,580	Innumerabl
25	6,000	Innumerabl
26	4,800	4
27	4,500	Innumerabl
28	9,180	Innumerabl
29	9,780	15,000
30	6,960	40
31	3,030	1
32	5,760	3
33	6,600	Innumerabl
34	2,700	Innumerabl
35	7,680	Innumerabl
36	6,660	1
37	4,020	Innumerabl
38	4,800	Innumerabl
40	2,880	4,560
41	1,980	0
42	3,900	Innumerabl

TABLE 5.—*The Effect of Various Concentrations of Penicillin in Urine on 13 Strains of Proteus Ammoniae*

Strain	Number of Bacteria in 0.5 Cc. of Urine									
	30 Oxford Units per Cc.		15 Oxford Units per Cc.		8 Oxford Units per Cc.		4 Oxford Units per Cc.		3 Oxford Units per Cc.	
	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	Afte 24 Hou Incub tion
1	4,800	117	1,980	3	9,000	780	6,120	Innumerable	.....	...
2	3,300	68	4,560	169	18,900	720	6,660	Innumerable	.....	...
3	3,420	1	1,200	4	2,100	14	2,340	12	1,500	Innume
4	2,880	0	3,360	1,860	1,980	Innumerable	3,960	1,080	400	Innume
6	8,100	0	3,840	22	2,820	133	6,360	Innumerable	.....	...
7	2,400	240	6,480	720	3,000	840	3,240	Innumerable	.....	...
8	1,080	22	1,680	12	3,240	24	2,160	Innumerable	.....	...
9	5,400	3	1,740	102	2,700	10	2,940	1,080	9	Innume
11	1,200	1	1,500	38	1,680	57	2,220	600	3,000	Innume
13	1,140	0	6,720	3,540	12,480	Innumerable	6,000	Innumerable	.....	...
14	2,160	1	2,520	27	2,400	27	2,940	Innumerable	.....	...
15	5,940	2	3,660	1,680	2,580	133	2,880	Innumerable	.....	...
16	3,000	1	1,860	38	1,320	0	1,140	6	900	Innume

3 strains and only 1 colony with 4 strains. O 2 of the 6 remaining strains showed more th

6. Abraham, E. P.; Chain, E.; Fletcher, C. M Gardner, A. D.; Heatley, N. G.; Jennings, M. A., Florey, H. W.: Further Observations on Penicill Lancet **2**:177-188 (Aug. 16) 1941.

colonies: 117 and 240 respectively. At 15 per cubic centimeter there was definite inhibition of all of the strains. At 8 units per centimeter the inoculation ranged from 0 to 18,900 per 0.5 cc., and the cultures twenty-four hours' incubation showed

LE 7.—*The Effect of Higher Concentrations of Penicillin in Urine on 23 Relatively Resistant Strains of Escherichia Coli* (see table 6)

ain	Number of Bacteria in 0.5 Cc. of Urine			
	60 Oxford Units per Cc.		45 Oxford Units per Cc.	
	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation
2	5,400	Innumerable	7,320	Innumerable
6	4,500	111	4,620	Innumerable
7	4,080	Innumerable	7,920	Innumerable
8	7,260	Innumerable	5,820	Innumerable
0	5,400	Innumerable	3,180	Innumerable
1	4,200	23	4,680	Innumerable
2	6,240	53	4,200	Innumerable
6	5,100	Innumerable	4,920	Innumerable
7	7,200	350	5,460	Innumerable
8	3,120	Innumerable	5,400	Innumerable
1	3,960	Innumerable	7,560	Innumerable
4	4,200	Innumerable	13,620	Innumerable
5	4,560	Innumerable	4,620	Innumerable
7	4,320	Innumerable	5,640	Innumerable
8	6,000	Innumerable	19,920	Innumerable
9	4,800	Innumerable	5,220	Innumerable
3	3,420	Innumerable	5,460	Innumerable
4	8,460	Innumerable	10,260	Innumerable
5	5,400	Innumerable	5,820	Innumerable
7	1,980	15	3,000	Innumerable
8	4,380	Innumerable	5,340	Innumerable
0	6,360	Innumerable	6,480	Innumerable
2	6,840	Innumerable	11,880	Innumerable

rked increase in only 2 strains, counts between and 900 with 3 strains and counts of 133 ess with the remaining 8 strains. At 4 units cubic centimeter 5 of the 13 strains were inted, and these 5 strains grew out to innumercubic centimeter of urine (table 6). At this concentration 16 strains exhibited inhibition of growth, 5 were completely killed off, 5 showed fewer than 5 colonies and in the remaining 6 the highest count was 144. After this preliminary experiment the 23 relatively resistant strains were subjected to tests with 45 and 60 Oxford units per cubic centimeter of urine (table 7). They all grew to innumerable with 45 units per cubic centimeter, but 5 strains were inhibited at 60 Oxford units per cubic centimeter, showing a decrease in number from the usual initial counts in the thousands to from 15 to 350 colonies after twenty-four hours' incubation. With the 16 relatively susceptible strains the effect of lower concentrations of penicillin in urine was tried out (table 8). At 15 units per cubic centimeter 3 strains were still inhibited, but at 8 and 4 units per cubic centimeter all 16 strains grew to innumerable. Of these 39 strains of Escherichia coli, only 21 (54 per cent) were inhibited at 60 units per cubic centimeter, 16 (41 per cent) at 45 and 30 units per cubic centimeter, 3 (8 per cent) at 15 units per cubic centimeter and none at 8 units per cubic centimeter.

4. *A. Aerogenes.*—Table 9 is a composite chart of a series of experiments carried out on the 18 strains of A. aerogenes. At a concentration of 30 Oxford units of penicillin per cubic centimeter of urine 2 (11 per cent) of the 18 strains were inhibited, but both these strains grew to innumerable at 15 Oxford units per cubic centimeter. The other 16 strains (89 per cent) grew to innumerable at 30 units per cubic

ABLE 8.—*The Effect of Lower Concentrations of Penicillin in Urine on 16 Relatively Susceptible Strains of Escherichia Coli* (see table 6)

Strain	Number of Bacteria in 0.5 Cc. of Urine					
	15 Oxford Units per Cc.		8 Oxford Units per Cc.		4 Oxford Units per Cc.	
	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation
1	1,500	0	1,440	Innumerable	1,740	Innumerable
3	4,080	Innumerable	2,280	Innumerable	4,980	Innumerable
5	1,440	Innumerable	2,100	Innumerable	2,400	Innumerable
9	1,920	2	1,320	Innumerable	2,460	Innumerable
13	1,320	Innumerable	1,260	Innumerable	1,200	Innumerable
14	2,460	Innumerable	2,040	Innumerable	2,520	Innumerable
15	1,500	Innumerable	1,980	Innumerable	4,200	Innumerable
19	1,320	Innumerable	3,000	Innumerable	2,460	Innumerable
20	2,220	Innumerable	2,400	Innumerable	1,380	Innumerable
23	960	Innumerable	1,560	Innumerable	1,080	Innumerable
26	3,420	Innumerable	1,500	Innumerable	3,240	Innumerable
30	3,480	Innumerable	3,480	Innumerable	4,980	Innumerable
31	3,120	Innumerable	7,260	Innumerable	4,920	Innumerable
32	1,920	Innumerable	1,620	Innumerable	3,300	Innumerable
36	2,580	108	3,600	Innumerable	4,080	Innumerable
41	1,920	Innumerable	3,180	Innumerable	6,600	Innumerable

e at 3 units per cubic centimeter. Thus at 8 ts per cubic centimeter a definite reduction the number of P. ammoniae organisms was ught about in twenty-four hours.

3. *Esch. Coli.*—We started our experiments 39 strains of Escherichia coli with a concention of 30 Oxford units of penicillin per centimeter. The 16 resistant strains were tested with 45 or 60 Oxford units per cubic centimeter, and only 1 strain yielded to the action of penicillin at the latter concentration.

5. *Ps. Aeruginosa.*—As is shown in table 10, all the 3 strains of Ps. aeruginosa grew to innumerable after twenty-four hours' incubation in

urine containing 60 Oxford units of penicillin per cubic centimeter.

6. *Staph. Aureus.*—The extreme susceptibility of Staph. aureus to the action of penicillin has been universally established. We included this organism in our studies not only because it is often encountered in urinary infections but also as a control for the other organisms on which we were trying out the effect of penicillin. During our work with this organism a few interesting facts were brought out.

TABLE 9.—*The Effect of Various Concentrations of Penicillin in Urine on 18 Strains of Aerobacter Aerog*

	Number of Bacteria in 0.5 Cc. of Urine							
	60 Oxford Units per Cc.		45 Oxford Units per Cc.		30 Oxford Units per Cc.		15 Oxford Units per C	
Strain	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubatio
2	—	—	—	—	2,220	0	3,000	Innumerab
3	1,800	100	2,400	Innumerable	2,400	Innumerable	—	—
5	3,120	Innumerable	4,200	Innumerable	1,980	Innumerable	—	—
6	4,200	Innumerable	3,000	Innumerable	2,640	Innumerable	—	—
7	4,800	Innumerable	7,200	Innumerable	4,320	Innumerable	—	—
9	5,400	Innumerable	4,200	Innumerable	2,640	Innumerable	—	—
11	4,260	Innumerable	3,600	Innumerable	1,440	Innumerable	—	—
13	6,360	Innumerable	3,000	Innumerable	4,260	Innumerable	—	—
14	4,440	Innumerable	2,400	Innumerable	3,000	Innumerable	—	—
15	3,780	Innumerable	2,400	Innumerable	6,000	Innumerable	—	—
16	6,420	Innumerable	Innumerable	Innumerable	2,760	Innumerable	—	—
17	3,900	Innumerable	3,600	Innumerable	720	Innumerable	—	—
19	6,600	Innumerable	5,640	Innumerable	4,680	Innumerable	—	—
20	3,600	Innumerable	2,460	Innumerable	4,920	Innumerable	—	—
23	4,200	Innumerable	3,360	Innumerable	3,180	Innumerable	—	—
24	—	—	—	—	5,400	1	2,280	Innumerab
25	4,620	Innumerable	1,620	Innumerable	2,340	Innumerable	—	—
26	5,580	Innumerable	4,800	Innumerable	6,120	Innumerable	—	—

TABLE 10.—*The Effect of Penicillin on 3 Strains of Pseudomonas Aeruginosa in Urine Containing 60 Oxford Units per Cubic Centimeter*

	Number of Bacteria in 0.5 Cc. of Urine	
Strain	Immediately After Inoculation	After 24 Hours' Incubation
1.....	6,540	Innumerable
2.....	11,820	Innumerable
3.....	8,220	Innumerable

TABLE 11.—*The Effect of Relatively High Concentrations of Penicillin in Urine on 5 Strains of Staphylococcus Aureus*

	Number of Bacteria in 0.5 Cc. of Urine					
	4 Oxford Units per Cc.		2 Oxford Units per Cc.		1 Oxford Unit per Cc.	
Strain	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation
1	0	0	0	0	0	0
3	2,100	5	4,200	4	5,400	240
6	0	0	1	0	120	0
8	0	0	2	0	35	21
9	0	0	3	0	2	0

Table 11 shows the results of one of our earlier experiments. With 4 Oxford units of penicillin per cubic centimeter of urine the initial plates "immediately after inoculation" of 4 of the 5 strains did not show any growth. Strain 1, which was later found to be one of the susceptible to the action of penicillin, gave growth also at 2 and at 1 unit per cubic c meter before incubation. This appa anomaly was later explained by the fact although these initial counts were labeled mediately after inoculation," some lapse of t was almost unavoidable between the inocula of the organisms into the urine containing p cillin and the moment when the appropr amount of inoculated urine had been transfe into the Petri dish and the sample was re for plating with warm agar. Another point t noted is that when 0.5 cc. of inoculated ur

TABLE 12.—*The Effect of Penicillin on Staphyloco Aureus in Urine in Relation to the Time of Incubation and Also the Amount of Urine Pour-Plated*

	Time of Incubation, Hours				
Strain	0	½	2	6	24
	Number of Bacteria in 0.1 Cc. of Urine				
1	13	1	0	0	0
2	600	156	0	0	0
4	840	600	0	2	0
5	126	4	7	0	0
	Number of Bacteria in 0.5 Cc. of Urine				
5	0	0	0	0	0

was used for the plating with 10 cc. of wa agar, the resultant concentration of penici therein still retained strength sufficient to ex bactericidal action on the staphylococci s pended in the medium.

With 0.1 cc. of inoculated urine contain 4 Oxford units of penicillin per cubic centime the counts dropped tremendously with strain and 5, from 13 and 126 to 1 and 4 respectiv in half an hour's time (table 12). When 0.5 of inoculated urine with the same concentrat of penicillin was used, strain 5 showed no gro

l, even when the "time of incubation" of the ulated urine in the test tube was cut down O hour." Obviously, these organisms were ually killed off while being suspended indi- ally in the solid agar medium, which con- ed a sufficient concentration of penicillin to a bactericidal effect even after dilution with agar during incubation for twenty-four rs.

able 13 shows that at a concentration as low 0.033 Oxford unit of penicillin per cubic imeter all of the 11 strains exhibited in- tion of growth. At 0.025 unit per cubic imeter only strain 6 showed inhibition.

COMMENT

ne outstanding fact that has perplexed both icians and laboratory workers is that peni- n is rapidly excreted through the kidneys ment of certain types of infections of the urinary passages.

Our experiments have shown that 3 Oxford units of penicillin per cubic centimeter of urine is sufficient to reduce the number of inoculated fecal streptococci greatly after twenty-four hours' incubation. Urine from patients may contain as much penicillin as 120 Oxford units per cubic centimeter.[8] Therefore it is likely that unless the kidney is too badly damaged the desired concentration of penicillin in urine can be readily attained, with a resultant curative effect on Str. faecalis infection of the urinary passages.

The results of our studies on P. ammoniae show that it is at least 4 times as susceptible to penicillin as Esch. coli but 240 times as resistant as Staph. aureus. This is in good agreement with the figures given by Florey and his co-workers, who found that P. ammoniae is

TABLE 13.—*The Effect of Relatively Low Concentrations of Penicillin in Urine on 11 Strains of Staphylococcus Aureus*

	Number of Bacteria in 0.5 Cc. of Urine											
	½ Oxford Unit per Cc.		¼ Oxford Unit per Cc.		1/10 Oxford Unit per Cc.		1/20 Oxford Unit per Cc.		1/30 Oxford Unit per Cc.		1/40 Oxford Unit per Cc.	
ain	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation	Immediately After Inoculation	After 24 Hours' Incubation
.....	224	1	5,880	3	2,700	85	780	1	2,340	240	1,380	Innumerable
.....	2,100	6	2,400	60	2,640	35	5,460	8	5,940	660	2,880	Innumerable
.....	3,300	600	1,380	478	2,160	1,320	1,980	600	1,680	600	2,040	Innumerable
.....	1,500	6	1,560	2	2,040	29	2,160	7	2,100	56	2,280	Innumerable
.....	2,820	34	1,200	0	1,920	184	2,820	480	2,400	360	3,180	Innumerable
.....	480	49	2,040	16	Innumerable	1,220	1,200	4	4,080	85	2,520	600
.....	1,200	23	1,920	11	1,920	13	1,200	2	4,020	91	6,540	Innumerable
.....	4,800	74	11,880	104	3,900	16	2,200	300	2,200	155	4,200	Innumerable
.....	1,980	15	1,860	2	1,380	15	2,060	2	3,000	420	3,960	Innumerable
.....	2,040	41	1,260	13	2,940	45	2,160	0	3,900	420	2,580	Innumerable
.....	660	9	1,620	0	540	5	1,500	5	1,500	77	1,080	Innumerable

the urine. It appears in much higher con- trations in urine than in any other body ds: Its concentration in the blood never ap- aches that found in the urine. With a normal al function an output in the urine of 58 per t[7] of the 40,000 to 100,000 units of injected icillin a day should give a concentration of n 20 to 60 units per cubic centimeter in the ne. In view of these high concentrations inable in the urine, it would seem logical to r that penicillin would be an ideal urinary iseptic. The present communication, which imited to in vitro studies covering the com- n bacterial flora encountered in infections of urinary tract, distinctly shows such a po- tiality. As the supply of penicillin has been adily increasing, the time will soon arrive en penicillin will be available in quantity, and ay well play an important role in the treat-

at least 4 times as susceptible as Esch. coli and at least 250 times as resistant as Staph. aureus. The low level of 8 Oxford units per cubic centimeter of urine at which P. ammoniae is reduced in number brings urinary infections with this bacillus into the range of successful treatment.

The work on Esch. coli, A. aerogenes and Ps. aeruginosa shows them to be of such a degree of resistance that penicillin may be of questionable value in clinical control of infections due to them. The sharp line of demarcation of Esch. coli into resistant and susceptible strains at 30 units per cubic centimeter, with little change at higher concentrations, is of interest and may well be of significance in clinical applications of these results.

The relative susceptibility of the various organisms studied is summarized in table 14. One thirtieth Oxford unit of penicillin per cubic centimeter of urine was sufficient to show definite

7. Rammelkamp, C. H., and Keefer, C. S.: The Absorption, Excretion, and Distribution of Penicillin, J. Clin. Investigation **22**:425-437 (May) 1943.

8. Heilman, D. H.: Personal communication to the authors.

inhibition in all strains of Staph. aureus. Str. faecalis was 90 times as resistant as Staph. aureus, P. ammoniae 240 times as resistant, Esch. coli at least 900 times as resistant and A. aerogenes and Ps. aeruginosa at least 1,800 times as resistant. These results agree fairly well with the observations of Florey and his co-workers and of others.

TABLE 14.—*The Relative Susceptibility of Various Organisms to Penicillin in Urine as Compared with That of Staphylococcus Aureus*

Bacteria	Oxford Units of Penicillin per Cc. of Urine Sufficient to Produce Inhibition	Susceptibility of Each Organism Relative to That of Staphylococcus Aureus
Staphylococcus aureus....	1/30	1 : 1
Streptococcus faecalis.....	3	1 : 90
Proteus ammoniae.....	8	1 : 240
Escherichia coli.....	30 or more	1 : 900 or more
Aerobacter aerogenes.....	More than 60	1 : more than 1,800
Pseudomonas aeruginosa.	More than 60	1 : more than 1,800

SUMMARY AND CONCLUSIONS

A detailed study of the bactericidal action of penicillin in urine on bacterial flora commonly encountered in urinary infections is presented. Thirty strains of Streptococcus faecalis, 39 strains of Escherichia coli, 13 strains of Proteus ammoniae, 18 strains of Aerobacter aerogenes, 3 strains of Pseudomonas aeruginosa and 11 strains of Staphylococcus aureus, all originally isolated from the urine of patients with various infections of the urinary passages, were emplo in these experiments. The following con sions are drawn:

1. For Str. faecalis a concentration of 3 ford units of penicillin per cubic centimete urine is bactericidal.

2. For Pr. ammoniae 8 units per cubic c meter of urine is the minimal bactericidal c centration of penicillin.

3. For Esch. coli there seems to be a of demarcation between the resistant and susceptible strains at a level of 30 Oxford u of penicillin per cubic centimeter of urine.

4. A. aerogenes and Ps. aeruginosa are resistant to the action of penicillin.

5. Staph. aureus has served satisfactorily this investigation as a control for the o organisms under study as to their respec resistance and susceptibility toward the ac of penicillin. The growth of this organism i is inhibited at a concentration of 0.033 Ox unit of penicillin per cubic centimeter of ur

6. The bactericidal action of penicillin at low level of its concentration in urine pres therapeutic possibilities for the treatment of fections due to Staph. aureus, Str. faecalis P. ammoniae. The resistance of Esch. coli, aerogenes and Ps. aeruginosa to penicillin p tically rules it out as a means of treating th infections.

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ROENTGENOGRAPHIC APPEARANCE OF THE ESOPHAGUS IN NORMAL INFANTS

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ta on the roentgenographic appearance of sophagus in infancy are meager. The only nsive study is that of Henderson[1] on the born. He found that the esophagus at this appears as a straight or fusiform tube with th contours. The lower half nearly always nds to a greater size than the upper, and may be considerable stasis in this portion.

METHOD OF STUDY

is series consisted of 32 infants, ranging in age from eks to 22 months, chosen at random from the wards llevue Hospital. All infants were well at the time xamination and were free from gastrointestinal toms. Several had recovered from minor infec-

e regular feeding was omitted, and in its place xture of barium sulfate and acacia, sweetened with r, was given.[2] The mixture was made thick enough rip through a 2 mm. nipple opening at the rate of t 1 drop per second. Approximately two parts of m sulfate and one part of powdered acacia mixed warm water were used. Accurate proportions ot be given, since the viscosity of the mixture d with a number of factors, such as temperature, rder in which the component parts were added and quality of the barium compound and of the acacia. e roentgenograms of all but 4 patients were taken the infants in the supine position. Two ounces cc.) of the mixture was offered. The exposure made as soon as possible after the first few lows. Films were taken simultaneously with the lowing reflex. This was not always easy to judge, three criteria were found helpful: tensing of the cles of the neck, momentary cessation of respira- and slight contraction of the abdominal muscles.

Roentgenograms were taken at a distance of 4 feet (1.2 meters). Though the distance between patient and tube was shorter than that ordinarily used with adults (2 meters), it is not likely that there was any significant distortion, since the depth of the chest in an infant is so much less than that in an adult. The time of exposure was one twentieth of a second and the milliamperage 200, with the voltage adjusted to the thickness of the chest. A fast Potter-Bucky diaphragm was used.

FLUOROSCOPIC OBSERVATIONS

As the infant swallowed the opaque mixture a narrow column could be seen descending rapidly through the esophagus (fig. 1 *A, B*). Ordinarily the material entered the stomach promptly at first, but as the feeding continued the cardiac orific opened and closed intermittently (fig. 1 *C, D*). At times material accumulated in the esophagus, especially in its lower portion, which became considerably distended and bulbous (fig. 2 *A*). In some instances the esophagus contracted in its middle third as well as at the cardia, and in such instances the organ had the appearance of a dumbbell, with enlargements above and below the central portion (fig. 2 *B, C, D*). From time to time bubbles of gas could be seen in the esophagus. As these were regurgitated from the stomach the opaque mixture also passed back up from the stomach, and this might occur for a considerable length of time after the feeding was completed. The barium might rise the entire length of the esophagus and be expectorated, or it might pool in the lower portion, which then became distended (fig. 3 *B*).

ROENTGENOGRAMS

The contours were uniformly smooth. In general the esophagus was sinuously curved, with the convexity to the left above and to the right below, but this was not always the case. In some instances it was curved as though it were too long for the thorax (fig. 4).

Presented before the Pediatric Section, New York demy of Medicine, March 11, 1943.
From the Children's Medical Service and the Dement of Roentgenology, Bellevue Hospital, and the artment of Pediatrics, New York University.

1. Henderson, S. G.: The Gastrointestinal Tract in Healthy Newborn Infant, Am. J. Roentgenol. **48**: 1942.
2. Buckstein, J.: Clinical Roentgenology of the Alitary Tract, Philadelphia, W. B. Saunders Company,

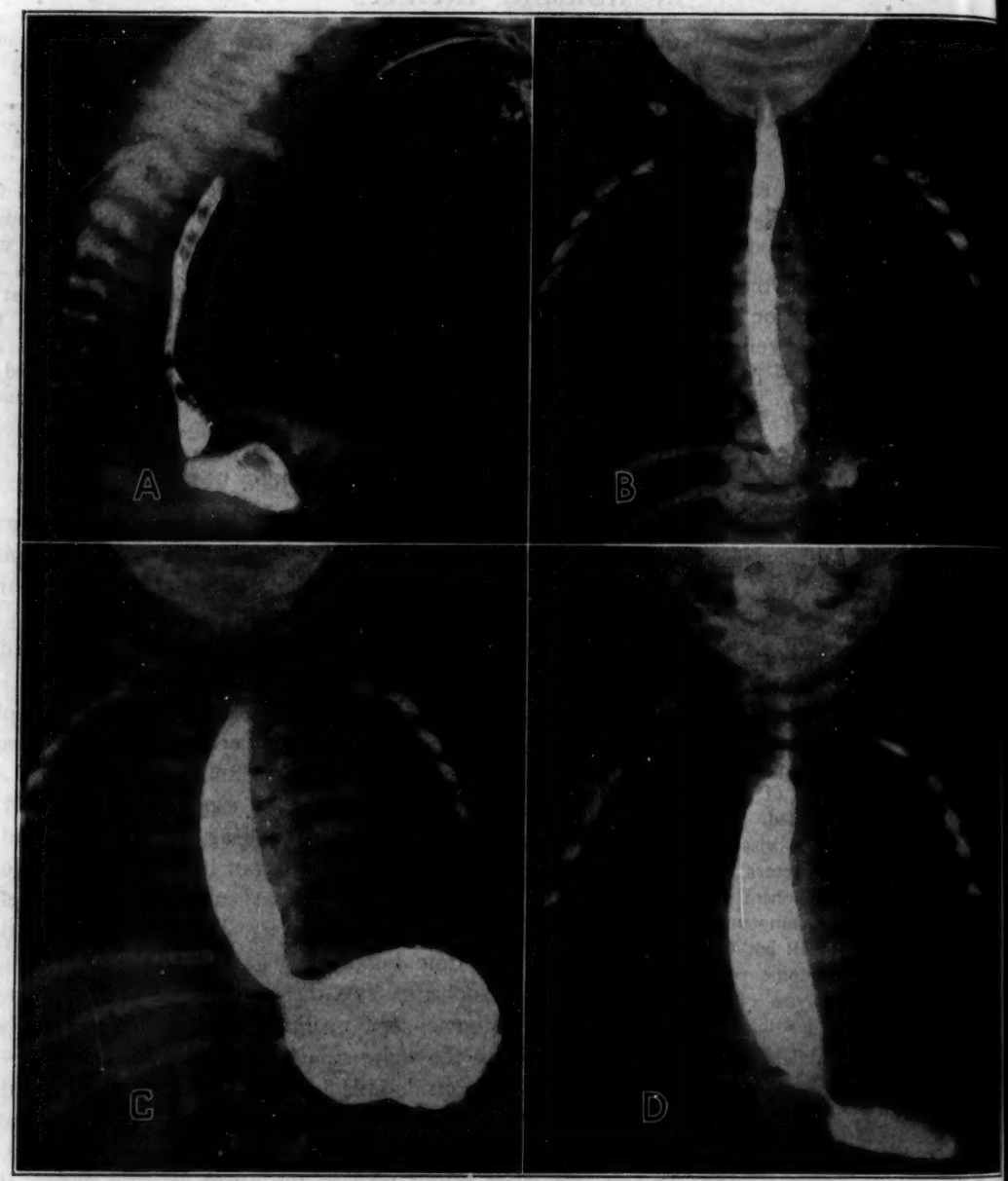
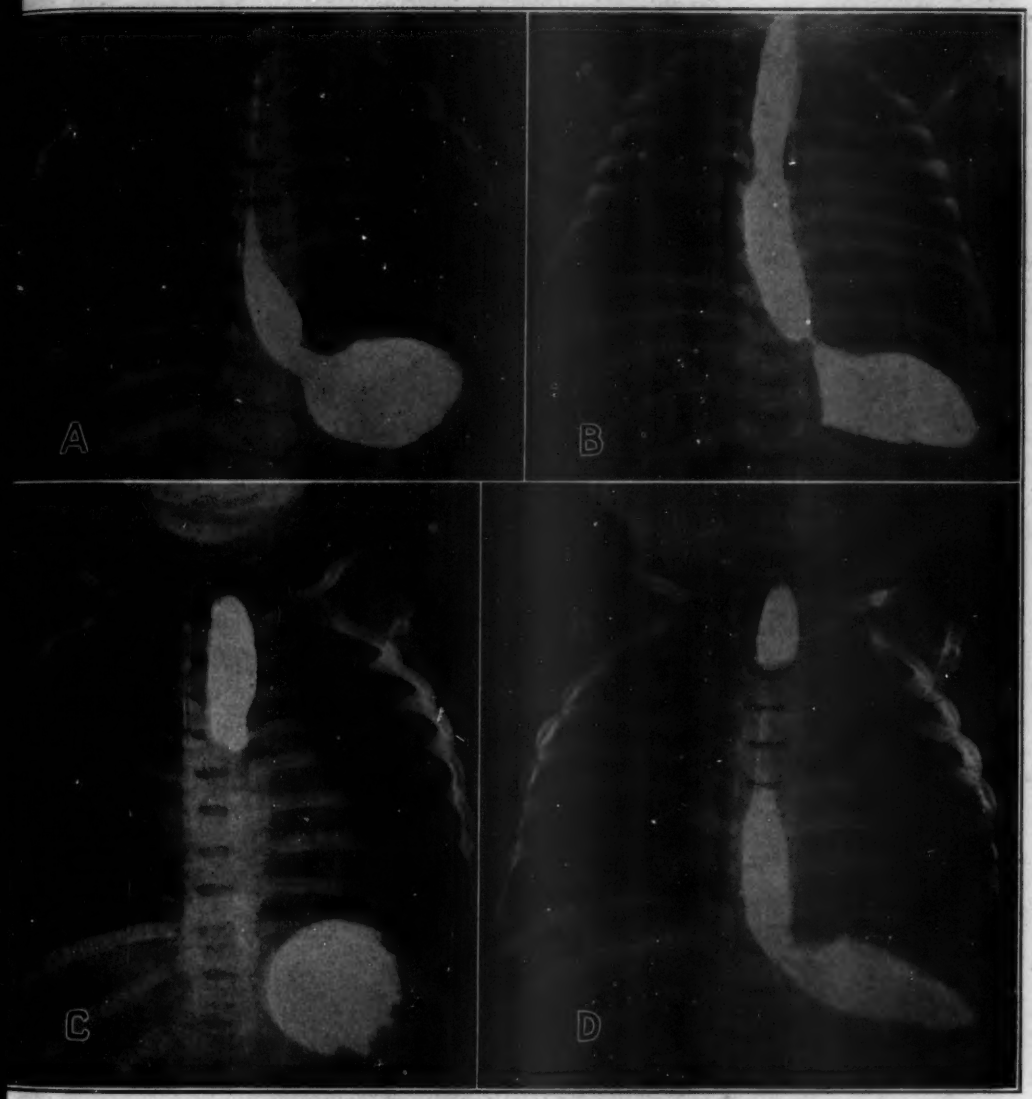


Fig. 1.—Esophagrams of normal infants. *A.* Five weeks old. The barium is mixed with air. The lower of the esophagus shows normal expansion. *B.* Four months old. *C.* Seven weeks old. The subdiaphragmatic segment is wide. The maximum diameter of the esophagus is 14 mm. *D.* Two months old. The subdiaphragmatic segment is narrow. The maximum diameter of the esophagus is 19 mm.



g. 2.—Esophagrams of normal infants. *A*. Twenty-two months of age. There is an accumulation of barium ure in the lower third of the esophagus. *B*. Three weeks of age. The midportion shows a shallow constric- *C*. Eighteen months of age. The barium mixture is momentarily retained in the upper third of the esophagus. Eighteen months of age. The upper and lower portions of the esophagus are filled with barium mixture; the lle portion is empty.

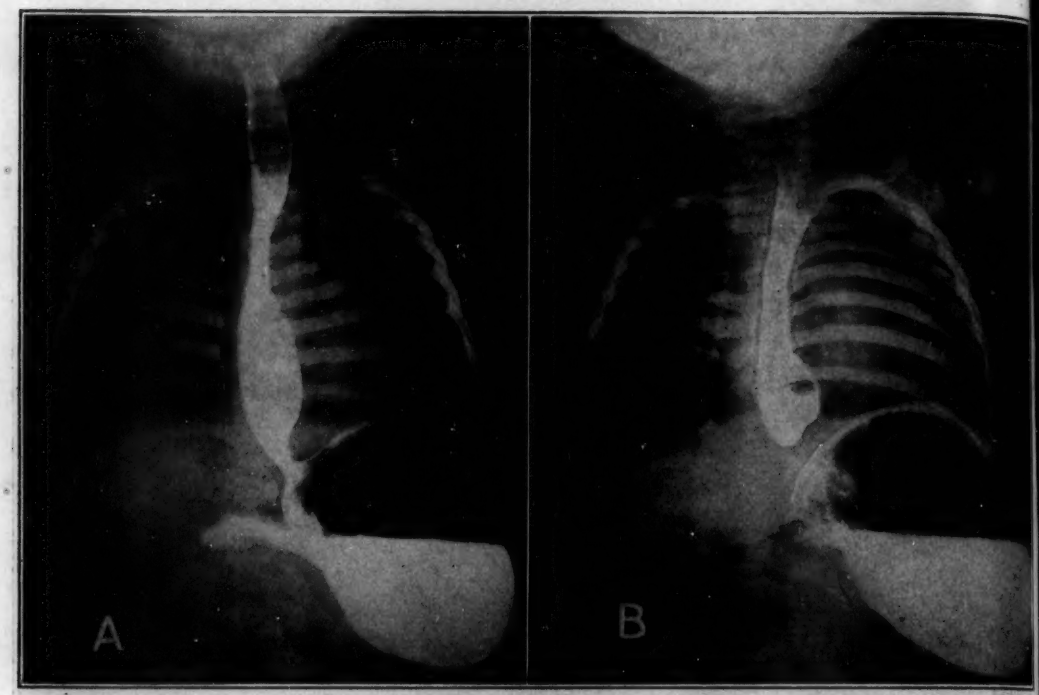


Fig. 3.—Esophagrams of an infant 6 months of age, showing the difference in configuration during the s feeding. *A* reveals the upper and lower thirds distended with barium mixture and air and the central third n row. *B* shows pooling of the barium mixture in the lower segment of the esophagus (diameter of the l bous portion, 16 mm.).

The esophagus in infants is markedly distensible. Roentgenograms taken during the course of a feeding of the barium-acacia mixture often showed an esophagus which was as wide as or wider than the vertebral column and which approximated in diameter that of a normal adu In most instances the organ was narrow at t beginning of the feeding, with a diameter about 4 to 8 mm., but it might be wide and d tended with bubbles of gas from the start.

Fig. 4.—Esophagram of a normal infant 16 months of age. The esophagus is tortuous.

The variability in the size and form of the phagus in different infants is illustrated in ires 3 and 5. The films in figure 3, of an nt 6 months old, were taken during the ne feeding at an interval of a few minutes. e films in figure 5, of another infant, were en on consecutive days. The diameter of the tral portion of the esophagus in the film en on Dec. 2, 1941 was 12 mm., and on the lowing day the diameter was 6 mm.

An accumulation of the barium mixture was asionally seen ballooning out the lower por- n of the esophagus several minutes after the ding had been completed (fig. 3*B*). That this terial was regurgitated from the stomach for some time after a feeding has been completed may be falsely interpreted as due to retention, especially if the subdiaphragmatic portion of the esophagus is visualized as a narrow, thread-like channel. It is therefore important to keep in mind that the esophagus in an infant is distensible to a marked degree and that pooling of material in the lower portion for a considerable length of time after feeding is common and is ordinarily due to reflux from the stomach.

SUMMARY

Roentgen studies of the esophagus with an opaque meal were made on 32 normal infants ranging in age from 3 weeks to 22 months.

Fig. 5.—Esophagrams of a normal infant 2 months old, taken on consecutive days, illustrating the distensibility the esophagus. *A*, film taken Dec. 2, 1941. *B*, film taken Dec. 3, 1941.

ther than retained in the esophagus by the ntracted cardia was suggested by Dr. John affey [3] and is evident from the fluoroscopic aminations. The subdiaphragmatic segment the esophagus could often be seen below the cumulated material as a narrow channel lead- g into the stomach.

COMMENT

The wide shadow cast by the esophagus of n infant in a roentgen film may readily lead an erroneous diagnosis of cardiospasm. Fur- hermore, the presence of food in the esophagus

3. Personal communication to the authors.

The esophagus in the infant is a distensible tube and may be as wide as or wider than the vertebral column.

Accumulations of opaque material are commonly seen distending the lower portion of the esophagus during a meal. They may also be present for some time after a meal and are ordinarily due to regurgitation from the stomach rather than to stasis or obstruction at the cardia.

Dr. Jacob Buckstein gave valuable suggestions during this study.

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ROLE OF HEMOAGGLUTININS ANTI-A AND ANTI-B IN PATHOGENESIS OF JAUNDICE OF THE NEWBORN (ICTERUS NEONATORUM PRECOX)

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PETACH TIQUAH, PALESTINE

The work of Levine [1] and others on the importance of the Rh factor in the genesis of erythroblastosis fetalis has stimulated general interest in the problem of jaundice of the newborn. All authors now accept the view that all forms of icterus in the newborn, physiologic as well as pathologic, are hemolytic in origin and that the liver does not participate at all in their causation. The bile excretion function of the liver of the newborn has recently been examined by Eastman,[2] who found that bilirubin injected intravenously in 25 newborn infants with and without icterus was equally well excreted in all; thus he proved that the liver is not a factor in the genesis of icterus of the newborn.

The question of the cause of the hemolysis in the various forms of icterus of the newborn has been answered as far as erythroblastosis fetalis is concerned by Levine and others. In all probability the Rh factor is the cause of the destruction of blood which results in the various aspects of erythroblastosis fetalis, such as icterus gravis, congenital anemia of the newborn and the marked stimulation of the forming centers.

The question arises whether the same factor or a similar one, such as some other hemoagglutinin, can be held responsible for the production of other, milder varieties of icterus of the newborn and whether there is any connection between the physiologic and the pathologic forms of icterus of the newborn. It is interesting that, while different authors report widely different incidences of erythroblastosis fetalis, they report equal differences in mortality from this disease. Clifford and Hertig [3] found erythroblastosis fetalis once in every 340 births, while Hellman [4] found it only once in 1,500 births. It is obvious that the diagnosis of erythroblastosis fetalis is far from being clearly differentiated; s authors have included conditions excluded others. In the past several years I have in tigated this problem, and the results are subject of this paper.

PRESENTATION OF DATA

Among 10,000 births I found only 9 case true erythroblastosis fetalis with all the cla characteristics of the disease; there was a m tality of almost 60 per cent. I found 60 ad tional cases of a type of icterus which w similar in some respects to erythroblast fetalis, but which in other respects resembl physiologic icterus of the newborn. Like eryth blastosis fetalis, icterus in these cases appear early—within twenty-four hours after birth and was at times no less intense than that erythroblastosis fetalis. As in children witho jaundice or with the physiologic form, the pro nosis in these cases was excellent. The childr appeared well, nursed vigorously, were alert a showed no marked loss of weight. Hemorrhag manifestations were lacking in all of them, a the liver and the spleen were not enlarged. shall designate this early icterus as icterus pr cox, to differentiate it from icterus gravis a from physiologic icterus.

The blood of patients with icterus prec showed no changes from the normal. Of children examined, only 3 showed a mild anem and none had a larger number of nucleated r cells than is normal for this age. Quantitati indirect van der Bergh tests were done on t umbilical blood of a number of newborn infan In 15 patients with icterus precox I found marked increase of bilirubin, an average of 1. mg. per hundred cubic centimeters, with minimum of 0.95 mg. and a maximum of 2. mg. In 13 newborn infants with physiolog icterus I found that the average level of bilirub in the blood of the cord was 0.73 mg. per hundr cubic centimeters, the minimum 0.0 mg. and t maximum 1.10 mg., while for 60 newborn i fants without icterus the figures were: averag 0.55 mg., minimum 0.0 mg. and maximu 0.75 mg.

1. Levine, P., and others: Role of Isoimmunization in Pathogenesis of Erythroblastosis Fetalis, Am. J. Obst. & Gynec. **42**:925 (Dec.) 1941.

2. Linn, H., and Eastman, N. J.: Behavior of Intravenously Injected Bilirubin in Newborn Infants, Am. J. Obst. & Gynec. **33**:317, 1937.

3. Clifford, S. H., and Hertig, A.: Erythroblastosis of Newborn, New England J. Med. **207**:105, 1932.

4. Hellman, H., and Hertig, A.: Erythroblastosis, Am. J. Obst. & Gynec. **36**:137, 1938.

especial interest was the determination of blood groups of the infants with icterus ox and of their mothers. Fifty-seven of 0 infants, or 95 per cent, had blood incom- le with that of the mother, so that the serum e latter agglutinated the red cells of the er. One hundred and sixty newborn chil- with physiologic icterus were examined e same period, and only 48, or 30 per cent, blood incompatible with that of the mother; e of 2,000 infants without icterus, only 530 5 per cent) showed incompatibility (table 1).

BLE 1.—*Compatibility of Blood of Children and of Mothers*

	Incompatible	Compatible	Total
ologic icterus.....	48	112	160
s precox.....	57	3	60
al.....	530	1,470	2,000

COMMENT

he appearance of severe icterus several hours birth has been noted by many obstetricians pediatricians; the majority have classified condition as physiologic icterus. Some ors, however, considered it a mild form cterus gravis, and this explains the great erences in the incidence and the prognosis cterus gravis reported by different observers. lieve that this early benign icterus does not ng in the classification icterus gravis. Neither it be included in the classification physiologic rus, for I believe that in the genesis of icterus ox, or early benign icterus, a specific factor rs, the passage of isohemoagglutinins anti-A anti-B from the mother to the child through placenta. These agglutinins hemolyze the nt's red cells and produce an increase of ubin in the placental blood.

his is not a new concept. Lenart and Biro [5] 927 already stated that hemoagglutinins are cause of all icterus in the postnatal period. ir argument is not convincing, however, for placed all forms of icterus in one group, duced by a single factor. I believe that the lutinins anti-A and anti-B cause only icterus ox and not the usual physiologic icterus, ch does not appear until twenty-four hours r birth.

he passage of these agglutinins from the her to the fetus by way of the placenta has n demonstrated by Hirszfeld and Zborowski [6] and others, who showed that in 30 per cent of newborn children it is possible to find hemo-agglutinins, which disappear from the blood after a short time. It is obvious that they were not produced in the blood of the child but passed to the child from the mother through the placenta.

The agglutinins anti-A and anti-B are milder hemolytic agents for the newborn than the agglutinin anti-Rh, for the former are absorbed by the antigen secreted by the tissues, while the latter is absorbed only by the red blood cells, the Rh factor being present only in the erythrocytes and not in the tissues. It is possible that in infants of the nonsecretory type in regard to antigens A and B—a type which, according to Schiff, includes 20 per cent of all human beings—the anti-A and anti-B agglutinins may cause a condition more severe than icterus precox, perhaps even erythroblastosis fetalis (table 2).

TABLE 2.—*Data on Blood of 15 Infants with Icterus Precox*

No.	Blood Group		Bilirubin in Placental Blood, Mg.	Red Cells in Placental Blood, Millions	Nucleated Red Cells	Hemoglobin, Gm. per 100 Cc.	Sex
	Infant	Mother					
1	A	0	1.60	3.6	+	9.0	♀
2	A	0	1.50	5.7	—	17.0	♂
3	B	0	2.20	4.4	—	14.4	♀
4	A	0	1.85	4.5	—	18.6	♀
5	A	0	1.60	3.5	—	13.6	♀
6	A	0	1.75	5.5	800	17.4	♂
7	A	0	1.70	5.9	—	17.0	♂
8	A	0	1.85	5.5	—	17.0	♀
9	A	0	1.75	7.0	—	19.4	♀
10	B	0	2.50	—	—	—	♀
11	A	0	2.20	—	—	—	♀
12	A	0	1.30	—	—	—	♂
13	B	0	1.25	—	—	—	♂
14	A	0	1.30	4.5	2,000	15.2	♀
15	A	0	1.60	5.5	—	17.2	♂

SUMMARY

The special form of icterus that is described is characterized by its early appearance—within the first twenty-four hours after birth—and its intensity. In these two characteristics it resembles erythroblastosis fetalis; otherwise it is similar to the ordinary physiologic icterus.

In 95 per cent of the cases of icterus precox I found incompatibility of the blood groups of the mother and the child—three times as often as with physiologic icterus and four times as often as in newborn infants without icterus.

The bilirubin content of the placental blood in these newborn infants was on an average 1.75 mg. per hundred cubic centimeters, as against an average of 0.75 mg. in physiologic icterus and 0.55 mg. in children without icterus.

Beilinson Hospital.

5. Lenart, G., and Biro, S.: Die Isoagglutination bei Neugeborenen und ihre Beziehungen zum Icterus natorum, Jahrb. f. Kinderh. **124**:77, 1929.

6. Hirszfeld, L., and Zborowski, H.: Fundaments of ologic Symbiosis Between Mother and Fetus, Klin. hnschr. **5**:741, 1926.

BETTER HELP FOR SPEECH BEGINNINGS

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In this article on the beginnings of speech I am writing certain ideas and judgments which are the result of a lifetime of study and practical work in the field of children's speech. During the last twenty-one years I have aided in conducting a school for children with speech difficulties, called the Hill-Young School of Speech Correction. The school functioned for six years in Minneapolis and for thirteen years in Los Angeles; for two years it has been a part of the speech department of the University of Denver.

I am writing now to call the attention of the physicians who care for young children to the fact that during these years many parents have come to me with children whose speech was still undeveloped at the ages of from 5 to 10 years or older. These parents had been assured by their physicians that speech would come and that they should go home and not worry about any possible trouble. And what else can the doctors advise? Their work is not that of speech trainers. They get their cues from those who work with speech. If they were convinced of the reliability of a therapy which would bring more effective results than the present way of dealing with speech beginnings they would be glad to recommend it instead of saying, "Don't worry: Speech will come."

The work which I have done with speech was founded on an experience of my own in which between the ages of 15 and 22 years I changed all my movements of speech. My sounds were produced in a difficult way, and the movements were practically all different from those used by the average speaker. Between the ages of 15 and 22 I studied the movements of speech, constantly checking to find wherein my own movements were different from those of other persons. Gradually during this period I segregated the procedures which seemed to produce the elements of speech. From then on I worked with children, wherever I found them, who needed to be helped into better speech habits. This study slowly evolved what is now known as the "motokinesthetic method."

During these years I also searched for the beginnings of speech difficulties. I found the same kind of mistakes, such as "dis" for "this" and "thee" for "see," repeating themselves, among children in the middle grades as we in the kindergarten. I went outside the s group to study the speech of the young chil in homes in the vicinity of the school. The mistakes were found among them. I found y children between 2 and 3 repeating incor forms—growing daily more fixed in their I began to wonder whether this particular group were not the one to concentrate on began to apply the motokinesthetic method fully, one step at a time, giving the childr feeling for the correct beginning, and found they responded well to this kind of teach The greatest difference in the child of 2 and child of 7 or 8 lies in the length of time neces for the correct method of speaking to bec habitual. Often a 2 year old would respon two weeks to the use of the new form and soon accept it as a part of his habits. Th year old could often be helped by the s method to say a word correctly the first he was worked with, but the habit of the was too strong to give up, and in everyday sp I heard the former habits continually repeat themselves for months. During the past tw years I have regularly spent some time develop and building up the speech of young childre from 1 to 3 years. I believe the results of work justify urging all who are interested developing normal speech to consider a cha in the present methods of dealing with sp beginnings in young children.

There are ways of managing the behavior environment which will tend to help the be nings of normal speech. There are certain w which encourage and aid the child; there others which discourage him. In the first pl a normal adjustment of father and mother important. If parents have found the way work out their own problems the child feel sense of security and relies on a strength out his own. All children need this. The emotio life developed under these conditions te toward a normal general development as as toward normal speech. If the father mother are not well adjusted the child is lik to sense the emotional upset in the home an often torn by conflicting emotions, though h not aware whence they come. In such c

e may be too much crying or laughing, ous abnormal uses of the larger muscles, such moving the arms up and down to show joy, running abnormally fast. Usually there are rums as well. Such an emotional state is not ducive to learning to talk. If the period ween 18 and 24 months of age goes by without beginnings of speech, a child may continue his ntile means of expression until he has become tuated to their use, in which case the learning peech is deferred. As the months pass, the d tends to gain speech less and less easily. habits first used for expression tend to me more and more fixed and may be a ous handicap in the effort toward speech. s important, then, that speech beginnings ede the formation of habits of expression ch later may interfere with the normal gain- of the use of spoken language.

One of the mistakes commonly made is talking t the progress of little children in their sence. In the work at the Hill-Young School hers have brought their speechless children to associates and me and have commented in r presence, "William will not talk. When ask him to say words he always refuses." ny a child is sensitive to the thought that is g expressed by the adult even though he not understand all the words. He is affected worried looks in parental eyes and worried s in the voices that are discussing him. He feel that the discussion is centered on him, this fact may cause him to respond even e negatively. One should not discuss the d in his presence.

Aside from all consideration of the psychologic ects of this subject, however, adults must p in mind that definite muscular processes st be learned step by step before the child talk easily. It is through this learned scular coordination that all thought is to be ressed in the months and years lying ahead. large percentage of children learn some of se speech processes incorrectly at first, in a l and error fashion. Correction necessitates aking up of these faultily learned sequences substitution of correctly formed processes patterns, which may involve simple movement, rdination of various movements or movement n entirely different set of muscles from those ich the child first learned to use. The new terns may also involve changes in tension, ssure and timing.

Changes in any pattern tend to confuse mus- ar action. Conflicts between the first and ond learning patterns frequently occur. The othness and fluency of the muscular move- nt necessary for good speech is interfered with. A large percentage of young children stumble over their words for a period, until the learning becomes stabilized. A smaller percentage become so conditioned to the kind of speech used during this period of struggle that they do not complete the correction but retain a struggling form of speech which may help to lay a foundation for a life of stuttering.[1]

The number of children who fail to acquire speech satisfactorily enough to have no after-effects in later years is large enough to make it imperative that one "do something about it" during the months when the best preventive measures are possible. And what are these preventive measures? They are based on a technic for training which makes learning speech a simpler task for the child who might otherwise get discouraged in his attempt to move on into speech. This technic has been built on the principle that when muscular learning is involved it is best to learn correctly when first learning; hence the advantage in the use of the moto-kinesthetic method when the child is not yet starting speech at the age of 18 to 24 months. It is safer to "do something about it" at this time than to wait until the age of 3 or 4 is reached. because progress is slower and more difficult at the later age.

The usual worried attitude, "Our child is not beginning to talk, and we wonder whether something is wrong with him," must be replaced by *this* attitude: "Our child is not yet talking at 2 years of age. This in itself is nothing to worry about, but since there are helps which can be given through training to combat any possible further delay and hasten the coming on of speech, we plan to give our child that help now." A careful study of the whole situation should be made, psychologic and environmental factors being considered. In addition to possible adjustments of these factors, use should be made of the helps obtainable from the application of the moto-kinesthetic method, a technic which moves the mouth and stimulates the correct beginnings of definite words and later on of entire words. This method should be employed whenever the casual naming of objects over a period of time has not been sufficient to start speech.

For instance, to teach "foot" the mother may move the child's lower lip upward against the upper teeth, blowing air herself in similar fashion to start the word "foot"; then she should immediately move the lower lip downward a little and toward the midline, sounding the vowel. The feeling of the production of the first two sounds in "foot" will stay within the muscles, and a

1. Hahn, E.: Stuttering, Stanford University, Calif., Stanford University Press, 1943, p. 49.

kinesthetic memory will thus be built up in association with the visual and auditory patterns. Several repetitions of the correct pattern tend to prevent the substitution of the "t" sound, in which the end of the tongue begins functioning instead of the lower lip, thus producing "toot." One should not expect immediate results from these "lessons." Beginnings should be stimulated, the word spoken casually and the child left to attempt the word when and where he wishes to do so. This technic stimulates the exact muscles which normally start the given word; the feeling of *how* to move, how much tension and pressure to apply and what timing is required—all is stimulated in one pattern.

The young child should never be forced into a lesson or into asking for things. There is a better, happier way. One too often takes it for granted that a young child *can* talk if he *will,* not understanding that a certain amount of learning and achievement precedes the automatic use of speech muscles.

The motokinesthetic stimulations which [illegible] the child toward the gaining of speech are [illegible] They have been published elsewhere.[2] [illegible] present article can only be suggestive. If [illegible] technic has been mastered by the adults [illegible] training of the child to speak correctly, [illegible] "come," not "tum," "see," not "tee," "I go," [illegible] "me do," and so on, is a delightful, profit[illegible] experience for the child and a happy one for [illegible] parents as well. Personality blossoms as [illegible] child finds in the beginning the correct way [illegible] express himself readily and easily. If cor[illegible] learning is delayed too long the persona[illegible] becomes dwarfed, restricted and emotion[illegible] warped. Fluent speech offers the grea[illegible] variety of opportunity for energy expendit[illegible] making for spontaneity and freedom and nor[illegible] emotional outlet.

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2. Stinchfield, S. M., and Young, E. H.: Chil[illegible] with Delayed or Defective Speech, Stanford Univers[illegible] Calif., Stanford University Press, 1938.

THE BONE MARROW AS AN ALTERNATE ROUTE FOR TRANSFUSION IN PEDIATRICS

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Henning[1] was the first to use the bone marrow as a route for transfusion. He tried to visualize the structure of the sternal bone marrow by the injection of watery contrast substances, such as abrodil (monoiodomethane sulfonic acid) and iopax (sodium salt of α-oxo-β-dipyridine-N-acetic acid), and failed because of the comparative density of the sternum. On the other hand, postmortem experiments showed that the presence of contrast substances could be noted in both internal mammary veins after injection into the sternal bone marrow. When thinner contrast substances, such as iodized sesame oil, were injected into the sternum, they were visualized roentgenologically. It was found that substances injected into the bone marrow entered the general circulation apparently unchanged and almost as rapidly as when injected intravenously. Tocantins and his associates[2] have shown that when mercury is injected into the bone marrow the metal may be seen by fluoroscopy to escape rapidly through the emissary veins into the general circulation. The intramarrow method of infusion is used when the veins of the extremities have all been damaged by repeated use or cannot be found, as in peripheral circulatory collapse, which prevents sufficient filling of the veins.[3] It is indicated when intravenous administration is impossible because of widespread mutilation, burns, edema, poorly developed or obliterated veins or shock.[4] For patients suffering from acute peripheral collapse with cardiac decompensation and for persons under insulin shock, who must have large amounts of material injected into the general circulation directly and in whom intravenous injection is impossible because of lowered circulatory flow or collapse of the peripheral veins, the bone marrow route offers the best solution. In the newborn and in other infants the accessible veins are very poorly developed. The superior longitudinal sinus, the jugular veins or the scalp veins offer too great a risk, or extreme dexterity on the part of the operator is required; hence the intramedullary route offers a good substitute. By this means advantage can be taken of a rapid method of introduction of blood as well as other fluids into the circulation.

The sites of election vary with the size of the patient. Many of the workers at the present time suggest that in children under 3 years of age one should use the upper portion of the tibia or the lower portion of the femur.[3b] The femur and the tibia are preferable to other sites in children because the density of the cortical layers of these bones is equivalent to that of the sternum or of the clavicle in adults. In patients above 2 years of age the site of election may be the manubrium of the sternum. It should always be kept in mind that the thinness and softness of the bony plates of the sternum in children do not allow as easy a differentiation to be made between the cortical layer and the marrow as is the case with adults. Though there are minor differences in the size of the marrow in infants and children, we prefer the following sites: the junction of the upper and the middle third of the tibia as first choice and as second choice the junction of the middle and the distal third of the femur. These sites are chosen because of their nearness to the surface of the body, the smallness of the amount of sub-

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1. Henning, N.: The Intrasternal Injection and Transfusion as Substitutes of the Intravenous Methods, Deutsche med. Wchnschr. **66**:737 (July 5) 1940.

2. (*a*) Jones, R. M.: A New Needle for the Treatment of Shock by Sternal Infusion, Surg., Gynec. & Obst. **76**:587 (May) 1943. (*b*) Tocantins, L. M.; Price, A. H., and O'Neill, J. F.: Infusions via Bone Marrow in Children, Pennsylvania M. J. **42**:1267 (Sept.) 1943.

3. (*a*) Tocantins, L. M., and O'Neill, J. F.: Infusion of Blood and Other Fluids into the Circulation via the Bone Marrow, Proc. Soc. Exper. Biol. & Med. **43**:782 (Dec.) 1940. (*b*) Tocantins, L. M.; O'Neill, J. F., and Price, A. H.: Infusions of Blood and Other Fluids via the Bone Marrow in Traumatic Shock and Other Forms of Peripheral Circulatory Failure, Ann. Surg. **114**:1085 (Dec.) 1941.

4. (*a*) Papper, E. M., and Rovenstine, E. A.: Utility of Marrow Cavity of Sternum for Parenteral Fluid Therapy, War Med. **2**:277 (March) 1942. (*b*) Tocantins and O'Neill.[3a] (*c*) Tocantins, O'Neill and Price.[3b]

cutaneous tissue present and the absence of intervening structures of any physiologic import, such as arteries, veins and nerves. It is not advisable to use the sternum in children under 2 years of age.[2b] We prefer to use the tibia rather than the femur because a shorter needle will allow entrance into the marrow proper. The thick muscles and intervening tissue about the femur make it necessary to use a longer needle. This needle is likely to bend under the pressure required to penetrate the bone.

In order to avoid the possibility of injury to the epiphysial cartilage, it is advisable that the needle be directed toward the diaphysis. Once the flow has started the leg should be raised slightly above the level of the body.

The danger of fat emboli has been minimized by Harris, Perrett and MacLachlin.[5]

Blood given through the marrow enters the circulation almost as rapidly as by the intravenous route. According to Papper,[6] the circulation time after sternal injection as determined by the macasol test is slightly, but not significantly, less than that after intravenous injection. His figures indicate that the material is absorbed from the sternal marrow at least as rapidly as from a vein. The cyanide test indicated that absorption from the sternum into the general circulation is more rapid than from a vein. The average end point after intravenous injection was fifteen and five-tenths seconds and after sternal injection only eleven and four-tenths seconds. Meyer and Perlmutter, using the intravenous and intramedullary route, found the circulation time to be essentially the same in 21 subjects. In 2 cases of cardiac decompensation the circulation time from marrow to tongue was less than the venous time. In a third case the results were identical.

The technic of intramarrow infusions is not difficult to master. Henning preferred a needle without a stylet.[1] The more recent investigators prefer a needle with a stylet.[7] In the case of femoral or tibial puncture the lateral surface is preferred. After preliminary preparation of the skin the needle is inserted vertically, with the bevel up. The osteum is penetrated wi rotary type of pressure until the compact is pierced and the needle enters the marrow. the case of sternal punçture the puncture is in the midline of the sternum at the level of third, fourth or fifth intercostal space. A sation similar to the cracking of an egg is usually heard or felt in the passage thr the cortical layer into the marrow proper. aspiration a pinkish fluid is withdrawn. indicates that the needle is in the bone mar

Some workers feel that no aspiration of marrow should be attempted.[1] The more re opinion is that if a small syringe—one of 2 —filled with isotonic solution of sodium chl is used—gentle aspiration may be made. I aspiration the saline solution in the syringe comes pinkish and only slight pressure on syringe barrel is necessary for emptying may be reasonably sure the needle is in the m row proper. Our feeling is that only by ge aspiration and viewing the pinkish discolora can we be reasonably confident that it is to start the infusion. One will note that manipulation there are definite directions of from the needle into the marrow which o less resistance than others. The needle sho be left in one of these positions.

The blood may be given either by syringe by means of a reservoir and slow drip. syringe is used when less than 100 cc. of is to be given or when rapid instillation is ess tial; the reservoir method, if large amounts being given or if a slow drip method is nec sary.

Our practice has been to flush the nee through with 2 cc. of isotonic solution of sodi chloride and then with a syringeful of the ma rial to be infused, before the reservoir is co nected to the bone marrow needle. This is do to guard against clotting in the bone marr or needle. Tocantins and his associates[8] ha suggested that one may use two bone marr needles inserted into the sternum in order obtain a more rapid rate of flow. This pr cedure probably could be adapted to pediat practice. Should the emergency be sufficien grave one may insert one needle into the fem and another into the tibia and connect the t needles by rubber tubes and a Y tube.

We have used two types of B.-D. needl The smaller is a no. 19 gage needle, and t length of the shaft is ½ inch (1.3 cm.); t larger is a no. 18 gage needle, and the leng

5. Harris, Perrett and MacLachlin, cited by Tocantins, L. M., and O'Neill, J. F.: Infusions of Blood and Other Fluids into the General Circulation via the Bone Marrow: Techniques and Results, Surg., Gynec. & Obst. **73**:281 (Sept.) 1941.

6. Papper, E. M.: The Bone Marrow Route for Injecting Fluids and Drugs into the General Circulation, Anesthesiology **3**:307 (May) 1942.

7. (*a*) Jones.[2a] (*b*) Papper.[6] (*c*) Papper and Rovenstine.[4a] (*d*) Tocantins, L. M.; O'Neill, J. F., and Jones, H. W.: Infusions of Blood and Other Fluids via the Bone Marrow: Application in Pediatrics, J. A. M. A. **117**:1229 (Oct. 11) 1941.

8. O'Neill, J. F.; Tocantins, L. M., and Pri A. H.: Further Experiences with the Technique Administering Blood and Other Fluids via the B Marrow, North Carolina M. J. **3**:495 (Sept.) 1942

he shaft is 1 inch (2.5 cm.). Because of the culty of obtaining at the present time either type of needle or any other satisfactory bone row needle, we have found that a special D. spinal tap needle cut down to the proper th is satisfactory. It has been our practice se the 19 gage needle for children under 6 ths of age and the 18 gage needle for older dren. We do not recommend using any dle larger than an 18 gage, because of the sibility of chipping the bone, the speedy out- from the needle and the danger of making large a puncture.

roper splinting of the child's hip, knee and le is imperative. An effective method of ntaining the foot in the proper position is use of the so-called "clove hitch" about the le, with traction made to the foot of the bed he end of the splint board.[8] To avoid inter- nce with venous return, no constricting hing or bandage should be applied to the remity above the site of puncture. Our meth- has been to apply only two strips of adhesive about 1 inch (2.54 cm.) wide to the limb. e strip is placed over the patella and secured er the splint board. The second is placed ut the arch of the foot and around the ankle; foot is rotated externally, and the end of the esive tape is fastened to the bottom of the nt board. This method is used satisfactorily both tibial and femoral punctures.

Because of the tendency of bone marrow to gulate, if there is any evidence of obstruc- n in the flow the needle should be manipulated d the stylet replaced to guard against possible tting in the needle. Occasionally it may be essary to inject some isotonic solution of so- m chloride to start the flow again. The rate of ection is usually much slower than that used intravenous drip. Too rapid a rate of injection the syringe method may cause edema in the rounding tissues of the limb because of the ckflow of venous blood through the emissary ns. It is well to remember that when large antities of fluids are given over a long period rate of flow may change. This condition can corrected by raising or lowering the height the reservoir. For the ordinary drip method height of the reservoir should be kept above meter. Reversal of the direction of flow ould not be permitted.

When an infusion has been completed the edle should be grasped firmly with one hand d the patient's limb with the other. The edle is then removed by a simultaneous rotary d withdrawing motion similar to that used in serting it. The site of the puncture should covered with a small sterile dressing; with an infant one should take the added precaution of sealing the entire dressing with adhesive tape for two days to prevent contamination from feces and urine.

This method should be employed only by persons experienced in the technic and should be used with considerable caution. Experience has shown that it is not advisable to inject material through the needle unless a bone marrow mixture has been obtained by aspiration.[9] A reversal of the direction of flow may cause clogging of the needle and should be avoided. Just as in intravenous infusion, a rapid rate of injection is not advisable. We have consistently used and found satisfactory a drip rate of about 10 drops per minute. When sternal punctures are attempted one must guard against piercing the posterior plate and injecting material into the anterior mediastinum. It is well to remember that if one needle puncture is made into a bone and an adjacent site is used soon after, especially if great pressure is applied, a "blowout" of the primary site may result. We use the term blowout to describe an ejection of the marrow clot through a puncture site with resulting passage from the marrow to and through the periosteum. We feel that intramedullary infusions are contraindicated in cases of generalized infections accompanied by bacteremia or septicemia and osteomyelitis.[10] If the needle is left too long in situ infection may result. Hypertonic or other irritating solutions which may also be sclerosing in action should not be given by the intramarrow method. Difficulty may be encountered in entering the marrow, particularly in some cases of anemia that produces an abnormal degree of ossification of the bone. In such instances we have found tapping the needle gently with a small mallet helpful in getting it into the marrow.

In addition to the conventional isotonic and hypotonic solutions used, the following are generally used in bone marrow infusions: blood plasma, blood, 5 per cent dextrose in isotonic solution of sodium chloride and sodium pentothal. The last-mentioned drug is now being used extensively under war conditions in intramarrow anesthetization on the battlefields and offers much for civilian medicine. Anesthesia was produced as rapidly and as readily by the intramarrow as by the intravenous route. The practical application of this method of anes-

9. Jones.[2a] O'Neill, Tocantins and Price.[8] Papper.[6] Papper and Rovenstine.[4a] Tocantins and O'Neill.[5] Tocantins, O'Neill and Jones.[7d] Tocantins, O'Neill and Price.[3b]

10. Tocantins, O'Neill and Jones.[7d] Tocantins, Price and O'Neill.[2b]

thesia in pediatric surgery should not be overlooked.

Complications of this procedure are similar to those encountered in intravenous infusions, for example, entering the surrounding tissues instead of the marrow or going through the bone and out of the posterior cortical layer. Routine preparations for blood transfusion using the bone marrow route, such as typing, are the same as for the intravenous route. Several cases have been reported in which the posterior plate of the sternum was pierced, with the fluid entering the anterior mediastinum and also of so-called "blowouts." The following case indicates one of the hazards of this procedure and the only untoward reaction we have had.

REPORT OF A CASE

A newborn white boy, weighing 4 pounds 3¼ ounces (1,907 Gm.) at birth, which was premature, showed symptoms of erythroblastosis fetalis. The patient was given 30 cc. of Rh-negative type O blood in the distal portion of the left femur; the following day he received 30 cc. of Rh-negative type O blood in the distal tion of the right femur and then a third transf in the left femur. The general condition of the pa appeared to improve. The following day a fairly palpable mass was noted over the distal portion o left femur, with definite tenderness and ecchym On July 23 roentgen examination showed consider swelling in the soft tissue structures in the prepat region, with no osseous pathologic changes in the fe fibula or tibia. On July 29 the area on the m proximal part of the left knee broke down, with a s quent discharge of a large amount of greenish ye pus. The condition remained unimproved by splin and local therapy. On October 10 a roentgen ex nation revealed some periosteal thickening along distal fourth of the femoral diaphysis with the arti surfaces normal and moderate prepatellar edema no definite evidence of osteomyelitis. Local drai and application of a 5 per cent aqueous solution sodium sulfathiazole and of a 1:10,000 solution zephiran chloride solution locally with contin splinting of the leg in extension improved the c dition. Fortunately, the infant continued to m good progress, and he was subsequently discharged.

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RESERVES, ABSORPTION AND PLASMA LEVELS OF VITAMIN A IN PREMATURE INFANTS

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The immaturity of organs and enzyme systems tributes greatly to the difficulty of neonatal ustment of premature infants. Their special ds for minerals and vitamins have been dis-sed by Levine and Gordon.[1] The degree to ich absorption, storage and requirement of min A are influenced by prematurity is a ject on which there is little information. Accurate methods for the determination of vitamin A content of plasma are now avail-e for clinical use, but because of the wide ge of values found in normal persons the ults are difficult to interpret. Lewis and his ociates have shown a relation between plasma els, intake and hepatic stores of vitamin A in mals.[2] This relationship has also been sug-ted for human infants,[3] though it may be ered in the neonatal period because of im-turity of the mechanism for mobilization of vitamin from body stores.[4]

The present investigation consists of three ies of observations: (1) study of the rise vitamin A in the plasma of 21 infants given standard dose of vitamin A and concomitant ermination of the excretion of fat by 10 in-ts; (2) determination of the levels of vita-n A in the plasma of 89 premature infants or about 3 weeks of age and their relation to th weight and vitamin intake; (3) examina-n for carotene and vitamin A of the livers of infants who died at or shortly after birth.

SELECTION OF SUBJECTS

Absorption of Vitamin A.—Tests were made on 20 thriving premature and full term infants from 6 to 70 days of age.[5] The premature infants weighed less than 2,500 Gm. at birth, but at the time of the tests some had exceeded this weight. The full term infants weighed more than 2,500 Gm. at birth; some had not regained their birth weight at the time of the test. All infants were free from infection, jaundice and gastrointestinal disease. Except for 1 infant fed on human milk all received a standard formula of evaporated milk, dextrimaltose or cane sugar and water, with no vitamin A supplement for twenty-four hours.

A modification of the vitamin A absorption test described by May, Blackfan, McCreary and Allen[6] was used. An oral test dose of 0.22 cc. of percomorph liver oil[7] per kilogram (0.1 cc. per pound) of body weight was given, and blood plasma levels were determined before and five hours after ingestion. A rise of 29 units or more above the fasting level was arbitrarily chosen to indicate good absorption of vitamin A.

Excretion of Fat.—Analyses for total fat in feces collected for seventy-two hour periods were made for 8 premature and 2 full term infants[8] during or immediately preceding the vitamin A absorption tests. The infants were all fed the aforementioned standard formulas containing an average of 120 calories per kilogram. The actual consumption of formula was calculated as 95 per cent of the formula as prepared, an average of 5 per cent of the intake being lost by adherence to bottles and nipples and by regurgitation, as

From the New York Hospital and the Departments Pediatrics and Public Health, Cornell University dical College.

1. Levine, S. Z., and Gordon, H. H.: Physiologic ndicaps of the Premature Infant: I. Their thogenesis, Am. J. Dis. Child. **64**:274 (Aug.) 1942.

2. Lewis, J. M.; Bodansky, O.; Falk, K. G., and Guire, G.: Relationship of Vitamin A Blood Level the Rat to Vitamin A Intake and to Liver Storage, oc. Soc. Exper. Biol. & Med. **46**:248 (Feb.) 1941.

3. Lewis, J. M.; Bodansky, O., and Haig, C.: Level Vitamin A in the Blood as an Index of Vitamin A ficiency in Infants and Children, Am. J. Dis. Child. :1129 (Dec.) 1941.

4. Lewis, J. M.; Bodansky, O., and Shapiro, L. M.: gulation of Level of Vitamin A in Blood of New-rn Infants, Am. J. Dis. Child. **66**:503 (Nov.) 1943.

5. Dr. H. J. Stander, head of the department of obstetrics, gave us permission to study the full term infants.

6. May, C. D.; Blackfan, K. D.; McCreary, J. F., and Allen, F. H., Jr.: Clinical Studies of Vitamin A in Infants and in Children, Am. J. Dis. Child. **59**:1167 (June) 1940.

7. 60,000 U. S. P. units of vitamin A per gram (0.9 cc.) (Mead Johnson and Company preparation).

8. One full term infant was malnourished and was therefore not included.

determined by Gordon, Levine, Deamer and McNamara.[9] Previous studies in this laboratory have shown the fat content of evaporated milk to average 8 per cent.

In accordance with the results of Gordon and McNamara,[10] an arbitrary dividing line of 60 per cent of the dry weight of the feces excreted as fat was used to separate the infants with excessive loss of fat from those with normal excretion.

Levels of Vitamin A in the Plasma of Premature Infants.—Determinations of vitamin A in the plasma were made on or about the third week of life for a series of 89 premature infants.[11] The vitamin A intake, maintained for each baby at a constant daily level from the third day of life until the day preceding the test, varied for the different infants from 60 to 24,000 U. S. P. units daily (table 1). Vitamin A assays of milk and milk products were performed in t laboratory.

The birth weights of the infants ranged fr 1,176 to 2,506 Gm.; 8 babies weighed less th 1,500 Gm. at birth, 11 between 1,500 and 1,6 16 between 1,700 and 1,899, 21 between 1,9 and 2,099, 22 between 2,100 and 2,299 a 11 above 2,300. Only 3 of the infants w Negro. There were 39 male and 50 female tients. The series included 7 pairs of tw

Babies admitted to the premature infants' s between November 1941 and April 1943 w remained in good condition were included in t part of the study. Approximately 30 per c of the original group were later dropped fr the series, primarily because they were discharg from the hospital before the eighteenth day life. A few were excluded because of diarr

TABLE 1.—*Intake of Vitamin A and Carotenoids by Premature Infants*

Milk Ingredient of Formula	Per 100 Gm. or Cc. of Milk: Carotenoids: Micrograms	Carotenoids: Vitamin A Equivalent,* U. S. P. Units	Vitamin A: Micrograms	Vitamin A: U. S. P. Units *	Total Vitamin A Value, U. S. P. Units	Daily Intake: Per Kg. of Body Weight: Gm. or Cc.	Daily Intake: Per Kg. of Body Weight: Vitamin A U. S. P. Units	Daily Intake: Per Infant† Vitamin A U. S. P. Units
Human milk.....	50	83	76	216.6	300	130-200	390-600	900
Evaporated whole cow's milk.....	75	124.5	57	162.5	287	55-70	158-190	350
Alacta.....	0	0	64	182.4	182	15-20	27-36	60

Supplement ‡	Vitamin A: U. S. P. Units per Gm.	Vitamin A: U. S. P. Units per Infant §
Synthetic oleovitamin D.....	0	0
Special mixture.....	12,000	4,500
Oleovitamin A and D.....	60,000	23,000
Navitol-S.....	55,000	23,000

* One microgram of carotenoids has a vitamin A value of 1.66 U. S. P. units. One microgram of vitamin A = 2.85 U. S. units.
† Average weight 2 Kg.
‡ Calculated from manufacturer's claims.
§ Dose 15 drops (approximately 0.375 Gm.).

9. Gordon, H. H.; Levine, S. Z.; Deamer, W. C., and McNamara, H.: Respiratory Metabolism in Infancy and in Childhood: XXIII. Daily Energy Requirements of Premature Infants, Am. J. Dis. Child. **59**:1185 (June) 1940.

10. Gordon, H. H., and McNamara, H.: Fat Excretion of Premature Infants, Am. J. Dis. Child. **62**: 328 (Aug.) 1941.

11. The analyses were made on the twenty-first day in 74 of the 89 cases. In the remaining 15 cases the day of the test was as follows:

Age, days	Number of Cases
14	1
18	2
19	2
20	3
22	5
23	2

(All but 4 infants were born in the New York Hospital.)

or a febrile illness or because of technical dif culties in obtaining or assaying the blood spec men. Nine babies who were discharged betwe 14 and 18 days of age and whose mothers we instructed to give a specified supplement dai except for the twenty-four hours prior to atten ing the outpatient department were included the series.

The infants in this group of observations re ceived three types of formulas: (1) whole, boile human milk; (2) evaporated cow's milk, wat and cane sugar; (3) Alacta,[12] water and ca sugar. Each formula was prescribed to furni from 100 to 130 calories per kilogram of bo weight per day.

12. Alacta is a preparation of cow's milk from wh more than half of the fat has been removed.

The daily vitamin supplement consisted of drops of one of the following preparations:

. Synthetic oleovitamin D U. S. P. (viosterol il).

. A mixture of 4 parts of synthetic oleovita- D U. S. P. with 1 part oleovitamin A and (natural) U. S. P.

. Oleovitamin A and D (natural) U. S. P.

. Navitol-S.[13]

e vitamin A content of the diet and supple- nts is shown in table 1. Rotation of formulas supplements in order of admission of the ients was later abandoned when it became dent that no correlation existed between the els of vitamin A in the plasma and the type formula ingested. From December 1941 ough June 1942 supplements 1, 2 and 3 were scribed approximately in rotation; from gust 1942 through January 1943 supplements nd 4 were prescribed for alternate patients, in February and March 1943 supplement as given to all babies. The supplements were en by dropper separately from the formulas were well tolerated in all instances.

Autopsy Material.—Samples of the livers of premature and mature infants were obtained autopsy.[14] These infants, 16 premature and mature, died within twenty-four hours after th from causes not thought to have influenced e vitamin A content of the liver, the anatomic gnosis being one or more of the following: maturity, intracranial hemorrhage, atelectasis. cording to their obstetric histories, the mothers d not had a serious infection, gastrointestinal hepatic disease or toxemia. The parents be- ged to a group with moderately low incomes, d the majority were followed in the antenatal nic of the Lying-In Hospital for varying iods prior to delivery. Detailed information their diets is lacking.

Shortly after death the bodies of the infants re placed in a refrigeration unit. Autopsies re performed on 21 infants and specimens of ir livers obtained for analysis within five to venty-two hours after death. The samples of er from the remaining 2 infants were obtained ur and six days respectively after death. When- er analysis of the liver for carotene and vita- n A content could not be performed imme- ately, the tissue was frozen. It was found that the vitamin A content of livers in the frozen state for four days did not significantly change. It seems unlikely that any considerable loss of vitamin A occurred during the interval between death of the infants and chemical analysis of the livers.[15]

13. Navitol-S, a mixture of fish liver oils and vi- erol in mannitan monolaurate, was supplied by E. Squibb and Sons.

14. From the obstetric and pathologic departments of New York Hospital.

CHEMICAL METHODS

Vitamin A and Carotenoids in Blood Plasma.—The microphotocolorimetric method of May, Blackfan, McCreary and Allen[6] for determination of plasma carotenoids and vitamin A is especially applicable to studies on small infants. Analyses were made on 1 cc. samples of plasma as follows:

Two cubic centimeters of 95 per cent ethyl alcohol and 2 cc. of petroleum benzine were added, the carotenoids and the vitamin A being extracted in the petroleum benzine layer. The micro unit of the Evelyn photoelectric colorimeter was used with selective color filters, the filter having a maximum light transmission of 440 millimicrons for determinations of carotenoids and of 620 millimicrons for determinations of vitamin A. The conversion of galvanometer readings into arbitrary units was made by the formula of May and his associates.[6] The terms 440 unit and 620 unit, derived from the filter used in each instance, are used to express the amounts of carotenoids and of vitamin A respectively. These units may be converted into micrograms or U. S. P. units by the following factors: One 440 unit equals 3 micrograms of carotenoids. One 620 unit equals 3 micrograms of vitamin A. One microgram of vitamin A equals 2.85 U. S. P. units. The factor for conversion of arbitrary colorimetric units into micrograms is derived from curves obtained by analysis of pure solutions of beta carotene and crystalline vitamin A; the factor for conversion from micrograms to U. S. P. units is the result of photocolorimetric analyses of solutions of vitamin A standardized in U. S. P. units.[16]

Fecal Fat.—Collections were made by scraping the stools from diapers into 50 per cent alcohol. Loss of stool was minimal. Total fat was determined on a sample of dried stool by the method of Tidwell and Holt.[17]

15. A. W. Davies (The Colorimetric Determination of Vitamin A by the Alkali Digestion Method, Biochem. J. **27**:1770, 1933) found no deterioration of vitamin A content of livers kept at room temperature for three days.

16. Dr. O. Bodansky supplied the latter material.

17. Tidwell, H. C., and Holt, L. E., Jr.: The Estimation of the Total Lipids and the Lipid Partition in Feces, J. Biol. Chem. **112**:605 (Jan.) 1936.

Analysis of Livers.—The macrophotocolorimetric method for the determination of the carotenoids and vitamin A content of plasma published by Kimble [18] and already in use in this laboratory was used for the analysis of liver tissue. From 75 to 95 per cent of the whole liver was minced, and 1 Gm. aliquots were weighed, ground to a powder with anhydrous sodium sulfate and shaken for ten minutes with alcohol and petroleum benzine. After centrifugation determination of carotenoids and vitamin A on the petroleum benzine fraction proceeded in the manner described for plasma by Kimble. The photocolorimetric readings indicated only traces of carotenoids.

Analysis of Milk.—Milk and milk products were assayed for carotenoids and vitamin A by the method of Kimble [18] after extraction with petroleum benzine in the presence of 95 per cent alcohol.

TABLE 2.—*Plasma Carotenoids and Vitamin A Absorption in Infants*

Number	Age, Days	Birth Weight, Gm.	Weight on Day of Test, Gm.	Plasma Carotenoids, 440 Units/100 Cc.	Vitamin A Levels in Plasma, 620 Units/100 Cc.		
					Fasting	5 Hours	Rise Above Fasting Level
Premature Infants							
1	11	1,870	1,880	13.8	21.9	56.8	34.9
2	11	2,120	2,300	12.3	7.2	10.5	3.3
3	12	2,200	2,500	4.5	3.4	60.6	57.2
4	14	2,210	2,270	9.4	12.0*	23.4	8.5
5	21	1,526	1,860	4.7	6.7*	8.6	1.9
6	21	1,710	1,920	2.5	8.3	12.8	4.5
7	28	1,750	2,330	12.9	14.7	60.2	45.5
8	45	1,475	2,430	5.7	11.0	68.6	57.6
9	60	2,000	3,400	4.0	8.6	50.6	42.0
10	60	2,050	4,040	13.9	18.0	83.2	65.2
Average	28	1,891	2,490	8.4	11.2	43.5	32.1
Mature Infants							
11	6	2,680	2,640	10.0	5.0*	43.4	38.4
12	6	3,230	3,140	10.6	7.4*	44.4	37.0
13	6	3,740	3,750	14.5	14.4*	24.5	10.1
14	6	4,100	4,020	12.1	24.4*	198.9	174.5
15	8	3,900	3,800	4.8	8.2*	39.9	31.7
16	8	3.030	2,940	8.8	13.6*	27.5	13.9
17	17	3,010	3,100	15.4	5.0*	115.0	110.0
18	26	4,050	4,410	10.1	7.9	115.0	107.1
19	38	3,420	3,880	7.7	11.0	56.2	45.2
20	70	3,290	4,460	7.5	16.2	94.6	78.4
Average	19	3,345	3,514	10.2	11.3	75.9	64.6

* No vitamin A supplements prior to test.

RESULTS

Vitamin A Absorption Tests.—The results of the vitamin A absorption tests on 10 premature and an equal number of full term infants are shown in table 2. The birth weights of the premature infants averaged 1,891 Gm.; the average of their weights on the day of the test was 2,490 Gm., and their ages ranged from 11 to 60 days. The carotenoid levels averaged 8.4 colorimetric units. The average fasting vita A level was 11.2 colorimetric units, and average rise in five hours above the fasting le 32.1 units. Four infants showed extremely p absorption of vitamin A in five hours. In remaining 6 the rise of the plasma level exce 29 units, and these infants were therefore c sidered to be good absorbers of vitamin A. infant over 21 days of age and weighing m than 2,300 Gm. showed poor absorption.

The age range of the mature infants on day of the test was approximately the same that of the premature infants. The average ca tenoid level for these infants was 10.2 col metric units. Their average fasting vitamin level was 11.3 units, and the average rise in hours above the fasting level was 64.6 un

Only 2 full term infants (no. 13 and no. 1 aged 6 and 8 days respectively, showed po absorption of vitamin A. Although there w some interlapping, the mature infants as a gro showed higher elevations in the plasma vitamin level at five hours, which indicated more efficie absorption of the vitamin. In both groups t older infants in general showed the higher rise Maximum elevations were found in the gro of mature infants, the rise in 3 infants exceed ing 107 units.

The results suggest that both age and prem turity influence the efficiency of absorption vitamin A.

Table 3 shows the intake, the excretion a the retention of fat in relation to absorption

18. Kimble, M. S.: The Photocolorimetric Determination of Vitamin A and Carotene in Human Plasma, J. Lab. & Clin. Med. **24**:1055 (July) 1939.

min A for 8 premature and 2 mature infants. relation of fecal fat to vitamin A absorption raphically shown in figure 1. Four prema- infants excreted more than 60 per cent of dry weight of the feces as fat. The feces he remaining 6 infants contained less than per cent of fat. On the basis of percentage in stools, 4 infants were poor absorbers of In general, the infants classified as poor orbers of fat failed to show good absorption vitamin A. One infant, classified as a poor orber of fat, however, retained 81 per cent he fat of his intake; he may be regarded as ing better absorption of fat than would be icated by the percentage of fat in dry weight tool. All 6 infants who were good absorbers at also absorbed vitamin A well. The results

8 other premature infants at various ages ranged from 2.0 to 33.6 colorimetric units per hundred cubic centimeters of blood (tables 4 and 5).

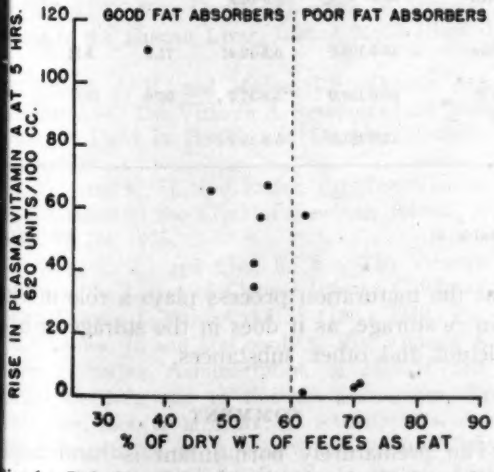
Weight at birth was not a factor in determining the level of vitamin A (table 4). The mean values for 44 infants who weighed less than 2,000 Gm. at birth and for 45 infants whose birth weights were 2,000 Gm. or more were 11.4 and 12.3 units respectively. A further breakdown into groups of infants not receiving and receiving vitamin A supplements respectively reveals that the smaller infants who received no vitamin A except that contained in milk averaged 8.2 units of vitamin A in the plasma and the larger infants averaged 7.7 units. In the groups which received vitamin A supplements the values for the smaller infants averaged

BLE 3.—*Fecal Excretion of Fat Compared with Absorption of Vitamin A in Premature and Mature Infants*

mber	Age, Days	Weight, Kg.	Dietary, Fat, Gm./Kg./ Day	Dry Weight of Stools, Gm./Kg./ Day	Fecal Fat		Percentage Retention of Dietary Fat	Rise of Vitamin A in Plasma in 5 Hours, 620 Units/ 100 Cc.
					Gm./Kg./ Day	Percentage Dry Weight of Stool		
1.....	11	1.88	5.50	2.09	1.09	54	78	34.9
2*.....	11	2.30	5.12	3.33	2.32	70	55	3.3
3.....	12	2.50	5.17	2.68	1.47	55	72	57.2
5.....	21	1.86	5.12	2.09	1.30	62	75	1.9
6*.....	21	1.92	5.39	3.38	2.40	71	55	4.5
8.....	45	2.44	5.29	1.66	1.01	61	81	57.6
9.....	60	3.40	5.02	1.91	1.08	54	79	42.0
10.....	60	4.04	5.17	0.72	0.34	47	98	65.2
17†.....	17	3.10	4.90	1.17	0.14	37	97	110.0
21‡.....	40	2.82	4.86	1.42	0.80	56	84	67.2

* Twin. †. Mature. ‡ Malnourished.

ggest a direct parallelism between absorption fat and absorption of vitamin A from the estinal tracts of these infants.



ig. 1.—Relation of fecal fat to vitamin A absorption.

Vitamin A in Plasma.—Levels of vitamin A the plasma of 89 premature infants on approximately the twenty-first day of life and of 15.2 units and those for the larger infants 14.4 units.

Regardless of size, there was a significant difference between the 38 infants who received no vitamin A concentrate and the 51 who received various vitamin A supplements, the former averaging 8.0 units and the latter 14.7 units (table 5). Figure 2 shows the distribution of infants with each level of vitamin A in the plasma, arranged in groups according to vitamin supplements received.

Fourteen of the 38 infants receiving synthetic oleovitamin D but no vitamin A supplement had levels between 2.0 and 5.9 units, and no value was above 21.9 units, whereas no babies receiving extra vitamin A had levels below 5.9 units, and 6 were in the higher range (22 to 33.9 units).

A comparison of the effects of the three vitamin A supplements (table 5) revealed a significantly higher mean plasma vitamin A value (17.6 units) for the infants given natural oleovitamin A and D in oil than for those receiving the special mixture containing only one fifth as much vitamin A, the mean vitamin A level of

this group being 13.4 units. Infants receiving the third supplement, navitol-S, which contained approximately the same amount of vitamin A as the first, had the lowest mean level of vitamin A in the plasma (12.1 units). No explanation is at hand for this variation, and too much importance should not be attached to it, inasmuch as the number of babies in each group was small (21, 11 and 19 respectively) and all three groups had values within the range of the normal ones found by Lewis, Bodansky and Haig.[3]

of livers of the premature group. The va for only 2 of the premature infants exce the minimal figures for the full term group. the averages of the total vitamin A conten the livers of the two groups are compare will be seen that the livers of the mature in contained more than five times as much vita A as those of the premature infants. Wit exception, the mature infants had more v min A stored in the whole liver than was fo in the premature infants. These findings indi

TABLE 4.—*Plasma Vitamin A Level in Premature Infants at Three Weeks of Age*

	Birth Weight Under 2,000 Gm.				Birth Weight 2,000 Gm or More				All Cases		
		Vitamin A 620 Units				Vitamin A 620 Units				Vitamin A 620 U	
Supplement	Number of Cases	Range	Mean	P. E. of Mean	Number of Cases	Range	Mean	P. E. of Mean	Number of Cases	Mean	P. E. of Mean
No vitamin A..	24	2.0-17.3	8.2	0.51	14	3.1-20.6	7.7	0.82	38	8.0	0.6
Vitamin A*....	20	7.0-23.0	15.2	0.82	31	6.1-33.6	14.4	0.86	51	14.7	0.8
All cases.....	44	.....	11.4	0.55	45	.....	12.3	0.71	89	11.8	0.4

* 4,500 to 23,000 U. S. P. units of vitamin A daily from third day of life.

TABLE 5.—*Plasma Vitamin A in Infants: Data in Present Study Compared with Those Reported in Literat*

	Subjects				Plasma Vitamin A				
					Range		Mean		
Authors	Infants	Ages	No. of Cases	Supplements *	U. S. P. Units	620 Units	U. S. P. Units	620 Units	P.
Present study.....	Premature †	14-23 days	38	No vitamin A	17.1-176.1‡	2.0-20.6	68.4‡	8.0	0.6
			11	Special	61.6-236.8	7.2-27.7	114.6	13.4	
			21	Oleovit. A and D	59.9-287.2	7.0-33.6	150.5	17.6	0.9
			19	Navitol-S	52.2-196.7	6.1-23.0	103.5	12.1	0.7
			51	All vitamin A	52.2-287.3	6.1-33.6	125.7	14.7	0.8
			89	All cases	17.1-287.3	2.0-33.6	100.9	11.8	0.4
	Premature §	11-60 days	8	Varying amounts	29.1-187.2	3.4-21.9	103.5	12.1	
	Mature	6-17 days	7	None	42.8-208.6	5.0-24.4	94.9	11.1	
		26-70 days	3	Varying amounts	67.5-138.5	7.9-16.2	100.0	11.7	
May, Blackfan, McCreary and Allen [4]	Full term	4 days to 6 mo.	5	No extra vitamin A	50.4- 93.2‡	5.9-10.9			
Lewis, Bodansky and Haig [3]	Full term	3 wk. to 3 mo.	35	No extra vitamin A	45.0-106.0	5.3-12.4‡	71.0	8.3‡	
			25	17,000 U. S. P. units daily	50.0-151.0	5.8-17.7	93.0	10.9	
			60	All cases	45.0-151.0	5.3-17.7			

* See table 1.
† See table 4.
‡ Calculated: one 620 unit = 8.55 U. S. P. units
§ Table 2, part 1, omitting infants 5 and 6, who are included in table 4).

Carotenoids of the blood plasma in these premature infants ranged from 0.2 to 31.1 units (table 6). No relationship was observed between these values and the levels of vitamin A.

Table 7 shows the vitamin A content of livers of infants who died within the first day. The livers of 16 premature infants contained an average of 48.3 micrograms (138 U. S. P. units) of vitamin A per gram. Those of 7 mature infants averaged 106.3 micrograms (303 U. S. P. units) of vitamin A, over twice the content

that the maturation process plays a role in vit min A storage, as it does in the storage of iro calcium and other substances.

COMMENT

The prematurely born infant is handicapp in the neonatal period by relatively low hepat reserves of vitamin A and impaired absorptio of the vitamin from the intestines. These hand caps rarely result in clinical signs of vitamin deficiency, but they indicate that subclinical d

ncy may develop quickly if the diet is not plemented with vitamin A.

he values for hepatic stores of vitamin A rted herein are generally higher than those rded for premature and mature infants by lff,[19] Ellison and Moore,[20] Toverud and ler[21] and Woo and Chu.[22] They correspond e closely to the values of Lewis and others.[3] correlation of storage of vitamin A with l age was demonstrated by these investigators. erud and Ender found a parallelism between amount of vitamin A stored in the liver and carotene and vitamin A content of the ma- al diet. It seems likely, however, that fetal erves of this vitamin are influenced not only the maternal diet but also, as indicated by results of the present study, by the maturity he fetus.

t was anticipated that the defect in absorption fat from the intestinal tract frequently found premature infants might be accompanied by r absorption of vitamin A. The association inefficient absorption of vitamin A with

BLE 6.—*Plasma Carotenoids and Vitamin A in Premature Infants at Age of About Three Weeks*

Vitamin A, 620 Units	No. of Cases *	Carotenoids, 440 Units	
		Range	Mean
2.0- 8.9	28	0.9-30.1	8.3
8.0-11.9	34	0.2-28.7	9.3
12.0-15.9	20	0.6-31.1	9.6
16.0-33.6	24	1.3-22.1	8.7

* One hundred infants, 6 repeated.

ronic steatorrhea was pointed out by Ches- y and McCoord.[23] Breese and McCoord,[24] ay and associates[25] and Spector, McKhann and Meserve[26] have reported this correlative relation in celiac disease, the celiac syndrome, cystic fibrosis of the pancreas and congenital atresia of the biliary ducts. Minimal elevations of plasma vitamin A in absorption tests occurred only in infants below 3 weeks of age, with maximal rises beyond this age period. This indicates that improvement in absorption of vitamin A occurs as the infants progress beyond the neonatal period. The extent to which absorption of vitamin A is specifically influenced by immaturity of the liver, low plasma lipids and variation in gastrointestinal enzymes and motility was not ascertained in this study.

In the infants studied, levels of vitamin A in the plasma were related to intake of vitamin A and unrelated to birth weight. The average value for premature infants receiving no supplements was 8.0 units (68.4 U. S. P. units). This compares closely with values found by May, Blackfan, McCreary and Allen[6] and by Lewis, Bodansky and Haig[3] for full term infants under 6 months of age that were given no supplement (table 5).

About one fourth of the premature infants receiving no supplement had levels at 3 weeks of age below 4.5 units (45 U. S. P. units) per

TABLE 7.—*Vitamin A Content of Livers of Infants*

No.	Age, Hr.	Gestation, Wk.	Body Weight, Gm.	Weight of Liver at Autopsy, Gm.	Micrograms Vitamin A per Gm. of Liver *	U. S. P. Units of Vitamin A per Gm. of Liver	Vitamin A in Whole Liver, U. S. P. Units
Premature Infants							
1	½	22	720	45	17.0	48	2,160
2	SB †	26	770	42	45.4	129	5,418
3	24	27	850	33	80.7	230	7,360
4	1	25	910	41	15.5	44	1,804
5	7½	24	960	44	36.3	103	4,532
6	6	24	1,030	40	49.7	142	5,680
7	6	24	1,120	44	62.2	177	7,788
8	1	29	1,165	55	52.1	148	8,140
9	SB	29	1,200	76	41.6	119	9,044
10	24	32	1,270	55	33.9	97	5,335
11	9	32	1,375	50	29.5	113	5,650
12	9	31	1,370	52	132.0	376	19,552
13	8	28	1,540	62	48.0	137	8,494
14	SB	32	1,590	80	51.0	145	11,600
15	12	36	1,700	58	19.0	54	3,132
16	SB	..	1,830	76	48.5	138	10,488
Average		26	1,213	53	48.3	138	7,261
Mature Infants							
17	SB	42	2,880	82	140.0	399	32,718
18	SB	40	3,085	145	84.0	239	34,655
19	SB	41	3,160	145	147.0	419	60,755
20	SB	42	3,290	180	68.5	195	35,100
21	20	40	3,320	110	138.0	393	43,230
22	SB	43	3,510	122	73.8	210	25,620
23	SB	42	3,985	180	98.2	266	47,880
Average		41	3,310	138	106.3	303	39,994

* 1 microgram = 2.85 U. S. P. units of vitamin A.
† SB = stillborn.

19. Wolff, L. K.: On the Quantity of Vitamin A esent in the Human Liver, Lancet **2**:617 (Sept. 17) 32.

20. Ellison, J. B., and Moore, T.: Vitamin A and rotene: XIV. The Vitamin A Reserves of the Human fant and Child in Health and Disease, Biochem. J. :165, 1937.

21. Toverud, K. U., and Ender, F.: The Vitamin A d D Content of the Liver of Newborn Infants, Acta diat. **18**:174, 1935.

22. Woo, T. T., and Chu, F. T.: The Vitamin A ntent of the Livers of Chinese Infants, Children and dults, Chinese J. Physiol. **15**:83 (Jan.) 1940.

23. Chesney, J., and McCoord, A. B.: Vitamin A of rum Following Administration of Haliver Oil in ormal Children and in Chronic Steatorrhea, Proc. c. Exper. Biol. & Med. **31**:887 (April) 1934.

24. Breese, B. B., Jr., and McCoord, A. B.: Vitamin Absorption in Celiac Disease, J. Pediat. **15**:183 ug.) 1939.

25. May, C. D., and McCreary, J. F.: The Absorpn of Vitamin A in Celiac Disease: Interpretation of e Vitamin A Absorption Test, J. Pediat. **18**:200 eb.) 1941. May, Blackfan, McCreary and Allen.[6]

26. Spector, S.; McKhann, C. F., and Meserve, E. R.: Effects of Disease on Nutrition: I. Absorption, Storage and Utilization of Vitamin A in the Presence of Disease, Am. J. Dis. Child. **66**:376 (Oct.) 1943.

cubic centimeter of plasma. If the criterion of Lewis and others [3] is used, levels below 45 U. S. P. units indicate vitamin A deficiency. The infants receiving supplementary vitamin A were all above this level.

SUMMARY

Tests for absorption of vitamin A were performed on 10 premature and 10 full term infants between 6 and 70 days old by determining the rise in plasma level five hours after the ingestion of a test dose. Four premature and 2 mature babies had evidence of poor absorption. The full term infants as a group showed higher elevations in the vitamin A level in the blood plasma after the test dose, and in both groups were significantly higher in infants who had ceived vitamin A supplements from the t day of life than in those not given extra vita A; about one fourth of the infants in the la group had levels below that usually conside an acceptable minimum value.

Livers obtained at autopsy from 16 premat and 7 full term infants who died within one of causes not thought to have affected vitami were assayed. Without exception, mature fants' livers contained higher stores of vitami than livers of premature babies. The aver amount in percentage was more than twice great in the full term infants, and the amo in the entire liver was more than five times great.

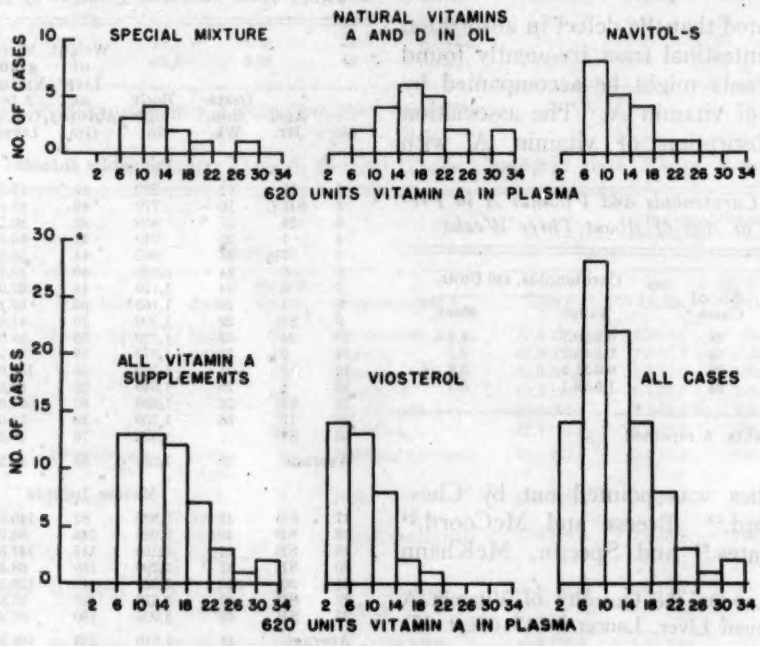


Fig. 2.—Frequency of plasma vitamin A levels in 89 premature infants.

age seemed to favor increased efficiency of absorption.

In 10 infants, 8 of whom were premature, retention and excretion of dietary fat were calculated from assays of fecal fat. In 3 of 4 infants with poor retention of fat, absorption of vitamin A was also poor, while all 6 infants who retained fat well absorbed vitamin A efficiently.

Levels of vitamin A in the blood plasma were determined by a microphotocolorimetric method for 89 premature infants at 3 weeks of age. The average values were of the same order of magnitude as those reported by other investigators for full term babies, but a wider range was found. Birth weight was not a factor in determining the level of vitamin A in the plasma. The levels

CONCLUSIONS

Because premature infants have relatively l reserves of vitamin A in the liver, because th are likely to absorb both dietary fat and vit min A less efficiently than full term babies a because many premature infants not receivi supplements of vitamin A have low levels in t blood plasma, deficiency of this vitamin may b expected to develop earlier in these infants.

These results suggest that early supplement tion of premature infants' diets with concen trates containing vitamin A is a desirable routi procedure.

Mr. George Mladenich rendered technical assistan Miss Schouten, head nurse of the premature unit, a her staff cooperated in the study.

CONVULSIONS EXPERIMENTALLY PRODUCED IN DOGS

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The phenomena of fits or convulsions have n observed in human beings and in animals oughout the ages, but the primary cause or ses of such convulsions are as yet not under- od. The study of disease produced at will in mals has been in many cases of inestimable ue in promoting a clearer understanding of the ease processes in human beings. Numerous empts have been made to produce in animals anges which lead to convulsive phenomena. me of these attempts have been eminently ccessful in producing a single convulsion or a ort series of convulsions. The use of insulin, trazol, thujone, electric shock, strychnine and forth for this purpose is well known. There however, no accepted satisfactory method for oducing in animals a series of spontaneous nvulsive seizures such as occurs in patients ffering from epilepsy. It was in the hope of scovering such a method that the experiments scribed in this report were done.

In 1926 Speransky[1] reported the production convulsions after the freezing of certain areas the cerebral cortex of dogs. We have per- rmed similar experiments, using the following rgical procedures:

The dogs were anesthetized with ether, and the surgical ld was carefully prepared. The skin, fascia and uscles were incised along the parietal and frontal ests and were reflected laterally, exposing the parietal d frontal bones. Enough tissue was left near the dline to make possible easy closure of the incision. n opening through the skull was then made with a phine over the site selected for a lesion. This open- g did not penetrate the dura. A piece of solid carbon oxide approximately 2.5 cm. in diameter was then ced directly on the dura and was held in place for o minutes. We had learned previously that freezing e brain for only one minute did not produce definite lesions or convulsions in every instance. Immediately after completion of the freezing, the opening in the skull was closed by replacing the piece of bone removed by the trephine. The bone was merely laid in the opening, and the muscles, fascia and skin were closed in layers over it. Immediately after closure of the wound the dog was permitted to recover from anesthesia and was carefully observed for the first appearance of symptoms.

Lesions were made in various areas of the left cerebral hemisphere. Each lesion was 2 cm. or more in diameter. The lesions in some instances were on or near the cruciate fissure and were definitely in the motor area. However, in most instances they were 2 cm. or more posterior to the cruciate fissure and extended laterally to the ectosylvian or ectolateral fissure. In 21 of the 44 operations the motor activity of each area was determined by direct faradic stimulation immediately prior to freezing.

Twenty-three of the dogs that recovered were operated on again after an interval of twenty-one to two hundred and ninety-seven days. At this time a lesion was made in the right cerebral hemisphere. The same surgical procedures and methods were used as in the first operation.

The results of the 44 operations on dogs can be summarized as follows: 1. Ten animals had convulsions after both the first and the second operation. 2. Nine dogs failed to show symptoms after the first operation but had convulsions after the second. 3. Three dogs failed to show symptoms after either operation. 4. One dog had convulsions after the first operation but not after the second. Of the remaining 21 dogs, which had only a single operation, 11 had convulsions after the operation but 10 did not.

Of the 44 dogs in which lesions of the left cerebral hemisphere were produced, 50 per cent showed symptoms attributable to the lesions and 50 per cent remained free of symptoms. The symptoms noted were similar except in a few atypical cases. Convulsions and epileptiform fits developed and were graded 1 to 4 according to their duration and severity. Two dogs failed to regain consciousness after operation. In all, 20 dogs died within from a few hours to eleven days after the operation. Fifteen of these animals had severe convulsions, and their deaths were directly or indirectly the result of the cerebral lesion.

The convulsions began at varying intervals after the operative procedure, sometimes within

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Read by title at the meeting of the Central Society r Clinical Research, Chicago, Nov. 5, 1943, and read full at the meeting of the American Branch of the ternational League Against Epilepsy, Philadelphia, ay 14, 1944.

1. Speransky, A.: Tissue Freezing Procedure for btaining Autoneurotoxin and Other Cell Autotoxins: reliminary Note, Ann. Inst. Pasteur **40**:213 (March) 26.

an hour, sometimes only after an interval of nearly twelve hours; most of the animals, however, began to have convulsions within six hours. The seizures recurred over periods of from one hour to thirty-six hours, after which time the animals either succumbed or recovered completely. The seizures were epileptiform, most of them generalized. There were twitching of the muscles of the face, clonic jerking of the legs, champing of the jaws and salivation. These activities were often followed by running movements. In certain animals there were rather localized convulsions, limited to the side of the body contralateral to the lesion.

Necropsy revealed at the site of freezing acute hemorrhagic lesions which had penetrated deeply into the cerebral tissue. In 2 instances there was hemorrhagic exudate in the adjacent lateral ventricle.[2]

The 23 dogs which were subjected to the second operation now had bilateral lesions in the cerebrum. In these animals the occurrence of symptoms was more frequent after the second operation, and as a rule the convulsions were more severe, than in the interval between the operations. In 19 (83 per cent) of the dogs convulsions and epileptiform fits occurred, whereas after the first operation only 50 per cent of the dogs showed symptoms. The attacks were severe in all the dogs that had convulsions.

The symptoms manifested were in most instances similar to those noted after the first operation, the only difference being that the fits were, in general, more severe and the clonic jerking of the legs was more disorganized. The postoperative time of occurrence of the symptoms varied. In one dog they appeared as early as forty minutes after operation, but in another dog they did not occur until eleven hours and thirty-two minutes after operation. The dogs that recovered did not usually manifest symptoms after the first postoperative day.

The depth of the lesion and the occurrence of subdural hemorrhage appeared to determine the severity of the symptoms. The lesions were deep and penetrating, and subdural hemorrhage was present around them. In the animals that died within a few days after operation bloody exudate was present in the lateral ventricle on the affected side.

Observations were made also on the effect of applying heat, salts and other substances directly to the cerebral cortex of dogs. In order to the effect of destroying a small area of cerebral cortex by heat coagulation, heat applied to the cerebral cortex of 9 dogs by me of hot running water in a glass applicator c taining a thermometer. In 2 animals the br was heated to from 50 to 60 C. for two minut in 3 others the temperature was kept betw 75 and 83 C. for two minutes; in the remain of the series the brain was heated for th minutes to between 72 and 80 C. There were immediate or delayed convulsive movements any of the animals. In 1 animal weakness of right side developed, and another vomited seve times. Otherwise no untoward symptoms w noted.

Kopeloff, Barrera and Kopeloff[3] in 19 stated that in monkeys, rabbits and guinea p epileptiform fits develop as a result of the plac of aluminum hydroxide cream or of prote precipitated by aluminum hydroxide cream the motor area of the brain. These writ found that attacks occur over a period of seve months after the initial lesion. We perform experiments on 27 dogs, using aluminum pot sium sulfate (alum). At first we placed a sm lump of alum beneath the dura of the pariet cortex in 2 animals. Both had severe conv sions and died, 1 in two days and the other seven. In later experiments it was found th a minimum of 10 mg. of alum per kilogram body weight was, except in 1 case, sufficient produce convulsions. The seizures varied fr moderate to severe and could be readily co trolled by intravenous injection of 5 mg. 10 mg. of pentobarbital sodium per kilogram body weight.

Twelve of the 27 dogs in the series of exper ments in which potassium alum was used su vived for two months or more. Six of the dogs had spontaneous convulsions after bei perfectly well for periods varying from two eight months. Three more of the same grou were found dead in their cages under conditio which made presumption of severe convulsio almost imperative: They had been seen to l perfectly well a few hours previously, and th disturbed condition of their cages, their postu and the general appearance of their cadave were similar to those in cases in which leth convulsions had been observed. We can sa then, that of the 12 dogs that lived more than tw months after the experiments with alum, 50 p cent certainly had spontaneous convulsions; in a probability the percentage was 75. This result

2. This phase of the subject has been reported by us more fully in another paper (Essex, H. E.; Schlotthauer, C. F., and Keith, H. M.: Symptoms Caused by Experimentally Produced Lesions in the Cerebrum of Dogs, Am. J. Vet. Research **5**:274 [July] 1944).

3. Kopeloff, L. M.; Barrera, S. E., and Kopeloff, N. Recurrent Convulsive Seizures in Animals Produced Immunologic and Chemical Means, Am. J. Psychi **98**:881 (May) 1942.

confirmation of the work of Kopeloff, Barrera Kopeloff, although these authors used a erent technic for the application of the sub- nce to the cerebral cortex.

n further experiments on dogs the following stances were placed beneath the dura; minum sulfate, chloride and acetate; potas- m sulfate and chloride and ammonium fate; magnesium sulfate and chloride; calcium oride; and sodium chloride and sulfate. In lition 70 per cent alcohol was injected into cortical substance. It was found that all of se substances with the exception of magne- m sulfate, magnesium chloride and alcohol duced convulsions in some of the dogs when to 24 mg. per kilogram of body weight was on cats, whose cortical tissue was frozen in the same manner as has been described for dogs. The results were entirely negative. Symptoms referable to the cortical lesion were absent. Symptoms did not follow freezing an area of the cortex a second time, contrary to what was so frequently the case with dogs.

Using the same technic as with the dogs, we then performed experiments on 4 monkeys. In these animals we have to date been unable to produce any convulsions, immediate or delayed, either by a first or a second freezing of an area of the cerebrum varying from 22 mm. to 28 mm. in diameter or by application of alum to the surface of the cortex in amounts varying from 10 mg. to 15 mg. per kilogram of body weight.

Convulsions Experimentally Produced *

mal	Substance Applied to Brain	Experiments	Results	Comments
	Solid CO_2	44	23 †	Two operations; convulsions in 82 per cent of animals after second operation
			+11, —10	One operation; convulsions in 52 per cent of animals
	Heat, 50-83 C.	9	— 9	No convulsions
	Alum, 5-12 mg./Kg.	27	+23, — 4	Convulsions in 85 per cent of animals
	Sodium chloride, 25 mg./Kg.	10	+ 8, — 2	Convulsions in 80 per cent of animals
	Calcium chloride, 10-25 mg./Kg.	5	+ 1, — 4	
	Potassium chloride, 15-25 mg./Kg.	2	+ 1, — 1	
	Alcohol, 3 cc. 70 per cent	2	— 2	No convulsions; hyperpyrexia, 115 F., in one animal
	Aluminum hydroxide cream, 2-3 cc.	3	— 3	Immediate convulsions did not occur, but 1 animal died in convulsion 4 months later
	Metallic aluminum powder, 0.3 cc.	2	— 2	No immediate convulsions, but 1 animal had delayed convulsion, from which it died
	Solid CO_2	6	— 6	Neither immediate nor delayed convulsions
nkey	Solid CO_2	4	— 4	Neither immediate nor delayed convulsions
nkey	Alum, 10 mg./Kg.	3	— 3	Neither immediate nor delayed convulsions

* In experiments using a single animal, in each experiment it was found that 15 to 25 mg. per kilogram of body weight of ium sulfate, potassium sulfate, aluminum sulfate, aluminum acetate, aluminum chloride and ammonium sulfate caused con- ions but that magnesium chloride and magnesium sulfate did not do so.

† Of 23 dogs on which 2 operations were performed, 10 had convulsions after both operations, 1 had convulsions after the but not after the second operation, 9 had convulsions after the second but not after the first operation and 3 did not have vulsions after either operation.

ced on or in the cerebral cortex. The con- lsions occurred as early as thirty-five minutes er the animal recovered from anesthesia or as g as twenty-four hours later. In these experi- nts 29 dogs were used; 14 of them survived. even of the deaths were thought to be due to effect of the chemical substance. In 1 case cause of death was not noted, and in 3 cases temper was the probable cause.

Two months after the original lesion had been de we attempted to produce convulsions in the rviving dogs by means of stimulation with rbon disulfide applied to the skin at the root the tail. This produced great excitement, but no instance were convulsive movements served.

A limited number of experiments were done in ich cats and monkeys (Macacus rhesus) were ed as subjects. Six experiments were done The monkeys have been under observation for four months. One monkey showed weakness on the contralateral side after application of alum to the cerebral cortex. In another monkey freezing of an area of the brain 28 mm. in diameter resulted in hemiplegia of the contralateral side.

The results of all the experiments are summarized in the accompanying table.

COMMENT AND SUMMARY

Grossly and microscopically the lesions produced by the application of alum to the surface of the brain are somewhat similar to the lesions caused by freezing. Both are characterized chiefly by edema and hemorrhage, but the lesions produced by freezing are localized and circumscribed, whereas those produced by the local application of alum tend to be diffuse. Not only

does alum destroy the nerve cells with which it comes in contact, but by causing injury of the intima of the blood vessels it also causes distant or remote effects attributable to vascular occlusion. Because of this fact, the lesions produced by alum are chiefly vascular in origin.

Microscopic study of acute lesions produced by the application of alum to the surface of the brain revealed marked edema and capillary hemorrhage. The cells appeared swollen and hydropic, and the intercellular spaces were filled with inflammatory exudate and blood. The intima of the blood vessels was edematous and thickened, and the smaller vessels frequently were occluded by inflammatory exudate. After a few days had elapsed the effects of ischemia were noted. The large nerve cells began to disintegrate and disappear, and only vacuoles remained to mark the places where they had been. The glial cells, being more resistant to effects of ischemia than the nerve cells, tended to survive, and as the nerve cells disappeared the fibrous elements in the lesion tended to contract progressively and to obliterate the spaces left by the nerve cells. The lesion eventually had the appearance of a small mass or band of fibrous tissue. Depending on the size of the original lesion and its site, the healing process caused varying degrees of distortion of the vasoastral framework of the brain—a fact which may account for the occurrence of symptoms many months after the lesion was made.

Convulsions, which were epileptiform, were the chief symptoms produced in dogs by freezing portions of the cerebral cortex. The convulsions were characterized by twitching of the muscles of the face, clonic and tonic spasms of the legs, champing of the jaws and salivation. In some cases the convulsive movements were limited to one side of the body. Running movements were common during the period of recovery. Disturbances of intelligence and sight were not observed. Particularly after the freezing experiments, a latent period between the operative procedure and the occurrence of convulsions was observed. This was sometimes as short as thirty-five minutes and sometimes as long eleven and one-half hours.

It is particularly interesting to note that in animals that recovered the symptoms produ by lesions in the cerebrum caused by free did not recur during an observation period many months. The animals that had the m severe symptoms did not recover. A "sta epilepticus" persisted in 1 case for as long thirty-six hours before the animal died.

It is of interest that heating the cortex to 8 did not cause any of the symptoms produced freezing or by chemical irritation or stimulati Speransky expressed the opinion that the sym toms manifested after the freezing of the cereb cortex are due to dispersion of toxic produ which are formed in the lesion. He stated t animals acquire resistance to this toxic substan If this were true the effects of a second les should be less severe than those of the first, b this is not the case. Our experiments did n therefore, confirm the opinion of Speransky.

Welker and Maslovitz[4] were unable to fi brain proteins in the blood of a large number the dogs whose brains we had frozen in t manner described. It would appear that if toxic substance is liberated it is not protein nature, or at least it is not present in the blo in sufficient quantity to be detected by the effe tive methods used by Welker and Maslovitz.

To date we have been able to confirm in dog but not in monkeys or cats, the work of Kopelo Barrera and Kopeloff in regard to the producti of recurring convulsions by the direct applicati of alum to the cerebral cortex. We have n explanation as to why freezing and the oth procedures described in the present pap produced convulsions in dogs but not in the oth animals.

The convulsions produced by the metho described could be controlled in most instanc by the intravenous injection of pentobarbi sodium.

4. Welker and Maslovitz: Personal communicati to the authors.

Case Reports

INFLUENZAL MENINGITIS IN SIBLINGS

MOSES COOPERSTOCK, M.D.
MARQUETTE, MICH.

In a recent report [1] the occurrence of influenzal meningitis in brothers was described, and the suggestion was made that this disease is potentially contagious, though the condition has generally been so regarded. The literature contained only one previous report of influenzal meningitis occurring in siblings.[2] It has now become established that type B Haemophilus influenzae is the causative organism in practically all cases of influenzal meningitis.[3] More recently this organism has been found to be responsible also for serious forms of infection outside the central nervous system,[4] namely, obstructive laryngotracheobronchitis and pneumonia associated with empyema in infants. The multiple occurrence of the latter infections in families in addition to meningitis may point to the potential contagiousness of type B H. influenzae infections in general, as indicated, for example, by the 2 instances of acute influenzal laryngitis in the same family mentioned by Sinclair.[4c]

The following report of an additional instance of influenzal meningitis in siblings may offer further evidence that this serious condition is potentially contagious and may lend support to the suggestion [1] that the institution of prophylactic measures for the protection of exposed susceptible subjects may be of real importance.

REPORT OF CASES

CASE 1.—M. S., a boy 2 years old, was admitted to the hospital on Sept. 27, 1942. Fever and a chill had developed two days prior to his admission, following mild coryza of approximately one week's duration.

On admission the boy was comatose. His temperature was 103 F. rectally. There was rigidity of the neck and spine. The Kernig and Brudzinski signs were absent. The deep reflexes of the arms and legs were not obtained. The superficial abdominal and cremasteric reflexes were likewise absent. Both ear drums were red and full, and their landmarks were indistinct. The lumbar puncture made on the patient's admission revealed the spinal fluid to be under pressure. The cell count for the spinal fluid was 1,200, with a preponderance of polymorphonuclear neutrophils. The globulin test gave a positive reaction, and sugar was qualitatively absent from the spinal fluid. A direct smear of the spinal fluid and a blood culture on the patient's admission both revealed gram-negative bacilli morphologically characteristic of H. influenzae.

The patient was given 3 Gm. of sodium sulfadiazine in 1.5 per cent solution intravenously, followed by 3.2 Gm. in 0.4 per cent solution subcutaneously over a period of twenty-four hours. Marked improvement was noted within twenty-four hours. After the first day sulfadiazine was given by mouth, the patient receiving 6 Gm. daily for one week. The level of sulfadiazine in the spinal fluid was maintained at 20 mg. per hundred cubic centimeters with this dosage. The patient's admission both revealed gram-negative bacilli reaching normal on the third day of hospitalization and remaining within normal limits thereafter. Administration of sulfadiazine was continued in decreasing dosage for an additional three weeks. He made an uneventful recovery.

CASE 2.—N. S., a 3 year old sister, was admitted to the hospital thirteen hours after her brother, M. S. She had had a chill and fever, followed by vomiting, eighteen hours prior to admission.

On admission to the hospital the child was stuporous. Her temperature was 103.2 F. rectally. There were nuchal rigidity and a positive Kernig sign. The left ear drum was injected and moderately full, but the short process was visible. Spinal fluid obtained by lumbar puncture was found to be under increased pressure. The cell count was 3,100. The test for globulin gave a positive result, and the level of sugar in the spinal fluid was decreased according to qualitative examination. A direct smear of the spinal fluid and a blood culture made on admission revealed gram-negative bacilli. Culture of the spinal fluid performed by the division of laboratories of the Michigan State Health

From the Northern Michigan Children's Clinic.

1. Hertzog, A. J.; Cameron, I. L., and Karlstrom, E.: Influenzal Meningitis in Brothers, J. A. M. A. **:502 (Feb. 19) 1944.

2. Davis, D. J.: Influenzal Meningitis, Arch. Int. d. **4**:323 (Oct.) 1909.

3. Pitman, M.: Variation and Type Specificity in cterial Species Haemophilus Influenzae, J. Exper. d. **53**:471 (April) 1931.

4. (*a*) Lemierre, A.; Meyer, A., and Laplane, R.: s septicémies à bacille de Pfeiffer, Ann. de méd. **39**: (Feb.,) 1936. (*b*) Holt, L. E., and McIntosh, R.: olt's Diseases of Infancy and Childhood, ed. 11, New rk, D. Appleton-Century Company, Inc., 1940. (*c*) nclair, S. E., with the technical assistance of Fousek, D.: Haemophilus Influenzae Type B in Acute ryngitis with Bacteremia, J. A. M. A. **117**:170 (July 1941. (*d*) Alexander, H. E.; Ellis, C., and Leidy, : Treatment of Type-Specific Hemophilus Influenzae fections in Infancy and Childhood, J. Pediat. **20**:673 une) 1942. (*e*) Alexander, H.: Treatment of Haemoilus Influenzae Infections and Meningococcic and eumococcic Meningitis, Am. J. Dis. Child. **66**:172 ug.) 1943.

Department revealed type B H. influenzae by the direct Neufeld method.

On admission the patient was given 3 Gm. of sodium sulfadiazine intravenously in 1.5 per cent solution, followed by 3 Gm. given subcutaneously in 0.4 per cent solution as an infusion over a period of twelve hours. Thereafter the patient received 6 Gm. of sulfadiazine daily by mouth for three days. The level of sulfadiazine in the spinal fluid with this dosage reached 18.1 mg. per hundred cubic centimeters. On the child's fourth day in the hospital the dose of sulfadiazine was increased to 9 Gm. daily, when the level of sulfadiazine in the spinal fluid had dropped to 8.6 mg. per hundred cubic centimeters. This dosage was gradually decreased after the first week, and use of the drug was discontinued after the twenty-eighth day.

The child's clinical condition improved rapidly after admission, her temperature reaching normal on the third day in the hospital and remaining within normal limits thereafter. She was alert and entirely clear mentally by the third day, and her recovery was uneventful.

COMMENT

In considering prophylactic measures for a family in which type B H. influenzae infection has developed, one would be concerned chiefly with protecting exposed infants and very young children, inasmuch as these infections are prevalent primarily in the early years of life. In one of the most recently reported series of cases of influenzal meningitis 79 per cent were found to have occurred within the first three years of life.[4e] The high incidence in this age period has been correlated with the low bactericidal properties of the blood against type B H. influenzae which have been found for the same age.[5]

In comparative studies on the protective capacity of the various sulfonamide compounds and of type-specific antibody, Alexander [4e] and Alexander and Leidy [6] have shown that sulfadiazine is the superior sulfonamide drug and that it has approximately the same inhibitory power against type B H. influenzae as has type-specific serum. They found the combination of these two agents to be superior to either agent used singly. As a single effective prophylactic a sulfadiazine would appear to offer the ad tages of ready availability and inexpensive when compared with type-specific serum.

While the outcome in the patients descri here is of interest as affording instances, ditional to those already reported,[7] of reco from influenzal meningitis under the in ence of sulfadiazine alone, this fact is necessarily to be regarded as evidence favor of chemotherapy as a solely adeq method of treatment of this disease. Alexan and her co-workers have demonstrated experimental studies and clinical results that of sulfadiazine and serum combined [8] has greatest capacity for cure of type B H. influen infections and that the use of sulfonamide dr alone is likely to be therapeutically effect when chemotherapy is initiated early in course of the disease and when the infection mild.[9]

SUMMARY

Influenzal meningitis occurred in 2 childr in the same family, and they recovered under influence of sulfadiazine. This report is m primarily as offering further evidence of the c tagious potentialities of type B Haemophilus fluenzae infections and as indicating the probab importance of prophylactic measures agai their occurrence in exposed subjects during susceptible age period of infancy and early chi hood.

5. Fothergill, L. B., and Wright, I.: Influenzal Meningitis: Relation of Incidence to Bacteriocidal Power of Blood Against Causal Organism, J. Immunol. **24**:273 (April) 1933.

6. Alexander, H. E., and Leidy, G.: Experimental Investigations as a Basis for Treatment of Type B Hemophilus Influenzae Meningitis in Infants and Children, J. Pediat. **23**:640 (Dec.) 1943.

7. Alexander.[4e] Sako, W.; Stewart, C. A., Fleet, J.: Treatment of Influenzal Meningitis w Sulfadiazine, J. A. M. A. **119**:327 (May 23) 19 Blumberg, M. L.; Tannenbaum, E. L. K., and Gl M.: Advances in Chemotherapy of Influenzal Me ingitis, J. Pediat. **24**:182 (Feb.) 1944.

8. Alexander, Ellis and Leidy.[4d] Alexande Alexander and Leidy.[6]

9. This statement should perhaps be modified in vi of the effect of age. W. Sako, C. A. Stewart and J. Fl (Treatment of Influenzal Meningitis with Sulfadiazi J. Pediat. **25**:114 [Aug.] 1944) have recently reported series of cases of influenzal meningitis with a high r of recovery for older infants and children treated w sulfadiazine alone. They stress, however, the impe tiveness of employing type-specific rabbit antiserum gether with large doses of sulfadiazine in the treatm of young infants.

HEMOLYTIC STAPHYLOCOCCUS PNEUMONIA IN EARLY INFANCY

RESPONSE TO PENICILLIN THERAPY

ANGUS McBRYDE, M.D.

DURHAM, N. C.

There have hitherto been no published reports the use of penicillin in the treatment of pneu- nia due to Staphylococcus aureus hemolyticus young infants. The following report of cases f value because of the ages of the patients, low dosage of penicillin required to effect overy and the lack of response to sulfadiazine.

REPORT OF CASES

ASE 1.—A boy aged 5 weeks, whose weight at birth 2,800 Gm. and whose neonatal course was smooth, week before his admission to the hospital began have a slight nasal discharge with considerable nasal truction. He had no fever and seemed in good con- on until eighteen hours before admission, when he an to vomit his feedings and his condition became idly worse. When admitted he was pale and list- but did not appear desperately ill. The infant did breathe through the mouth. There was a profuse al discharge, with marked nasal obstruction which ulted in moderate dyspnea. The throat was moder- y injected. There were no abnormal findings in chest. The leukocyte count was 9,500, with neutro- ls 59 per cent (46 per cent segmented, 9 stab, 4 per t juvenile). The hemoglobin content was 89 per t. Roentgenograms of the chest showed moderate eralized prominence of the markings of the lungs no definite areas of consolidation. Cultures of terial from the throat showed large numbers of nolytic staphylococci (Staph. aureus).

The infant received sulfadiazine 0.1 Gm. every four rs for twenty-four hours before admission, and inistration of the sodium salt was carried on sub- aneously for the first five days in the hospital. The ant's temperature varied from normal to 38.8 C. 2.6 F.). He was placed in an oxygen chamber, the ygen having been saturated with moisture by pass- through boiling water. With each attempt at feed- , the infant became cyanotic and vomited. Twenty- r hours after admission and forty-eight hours after fadiazine therapy had been begun he appeared almost ribund. The chest was filled with many fine crepi- t rales and a moderate number of coarse rhonchi. nicillin therapy was begun at this time, with an tial intramuscular injection of 5,000 units, followed 1,000 units every two hours, so that 41,000 units s given over a period of three days. Six hours er the treatment with penicillin was started, improve- nt began, and after three days the infant no longer eded oxygen and was able to take feedings by mouth. e thoracic signs disappeared rapidly, and convales- nce was uneventful. At the time of writing he is healthy infant 7 months of age.

From the Department of Pediatrics, Duke Univer- y School of Medicine, and Duke Hospital.

CASE 2.—The second infant was admitted to the hospital, at 4 weeks of age, because of pneumonia and inability to be aroused. He weighed 2,600 Gm. at birth and progressed well until 2 weeks of age, when he had an infection of the respiratory tract with pronounced nasal obstruction. When he was last examined by his physician, eighteen hours before his admission, the chest was clear and he seemed in good condition; he was slightly pale but not acutely ill. Nine hours before admission he became lethargic and could not be aroused. On admission the child was dehydrated and slightly cyanotic. He was having considerable difficulty in breathing through the nose, and his respirations were of the Cheyne-Stokes type. The tongue was coated, and the throat was red. There was considerable mucopurulent discharge in the oropharynx. Many fine rales could be heard, especially about the hilus of the right lung. Cultures of the throat taken on his admission showed large numbers of hemolytic staphlococci. No roentgenogram of the chest was taken because of the precarious condition of the infant. Studies of the blood made on his admission showed hemoglobin 74 per cent, leukocytes 14,040 and, neutrophils 65 per cent (segmented 52 per cent, stab 11 per cent, juvenile 2 per cent).

He was immediately placed in an oxygen chamber, with the oxygen passing through boiling water to increase its content of moisture. He was given fluids subcutaneously and intravenously. An initial dose of 0.3 Gm. of sulfadiazine was followed by 0.25 Gm. of the sodium salt every six hours given subcutaneously. This dosage was continued for forty-eight hours without appreciable improvement. Administration of penicillin was then begun, with an initial dose of 5,000 units given intramuscularly, followed by 1,000 units every two hours for two days. On the third day, 1,000 units was given every three hours for a total of 50,000 units. The infant became extremely edematous, so two transfusions of plasma of 50 cc. each were given. Improvement was noted twenty-four hours after treatment with penicillin was begun and after three days the infant was out of danger. The chest signs gradually disappeared, so that four days after the treatment with penicillin was begun no abnormal signs were present. His temperature was 38.8 C. (101.6 F.) on admission and gradually dropped to normal after seventy-two hours. He remained well up to the time of writing, when he was 7 months of age.

COMMENT

The importance of nasal obstruction in acute infections of the respiratory tract in young infants must be stressed. Often the exhaustion produced by dyspnea from nasal obstruction is the main factor in aiding spread of the infection into the tracheobronchial tree. Every effort

should be made to prevent such obstruction, including irrigation of the nasal passage with 0.25 per cent of neo-synephrine hydrochloride or some other shrinking agent, repeated nasal suction and continuous administration of oxygen.

Diffuse inflammatory reaction in the smaller bronchi of infants results in severe dyspnea and cyanosis. Frequently death occurs from asphyxia and toxicity before consolidation of the lungs can be demonstrated. The rapidity with which an apparently trival infection of the respiratory tract progesses to a desperate illness is illustrated by the brief course of illness of the patients herein described before hospitalization.

Infection caused by pneumococci and by beta hemolytic streptococci usually responds readily to adequate therapy with a sulfonamide compound. Staphylococci are much more resistant to sulfonamide compounds, and death often occurs in a few days even when adequate doses of one of these drugs have been administered. It is my impression that young infants with bronchopneumonia who do not make a dramatic response to such therapy in twenty-four hours should be treated with penicillin without de Cultures should be made, but treatment w penicillin should be started at once without wa ing for the report from the laboratory.

SUMMARY

Two instances of hemolytic staphyloco pneumonia in infants of 4 and 5 weeks spectively are reported.

These 2 patients were given sulfadiazine adequate dosage for forty-eight hours bef treatment with penicillin was started. Th conditions became worse, and though the of sulfadiazine was continued, the dramatic i provement after penicillin was administe seemed to be due to that agent.

The total amount of penicillin given the infants was 41,000 and 50,000 units respectiv It seems logical to assume that even in sev infections the dosage of penicillin needed the treatment of young infants is much smal than that required by older children or by adu

Duke Hospital.

Abstracts from Current Literature

Biochemistry; Bacteriology, and Pathology

E RESISTANCE OF MENINGOCOCCI TO DRYING. C. PHILLIP MILLER and DORETTA SCHAD, J. Bact. **47:** 71 (Jan.) 1944.

The authors state that interest in the resistance of ningococci to drying dates back to the observation Albrecht and Ghon in 1901. Since that time a nber of studies have been made. The present one cerns only the duration of viability of meningococci d in films on various objects (glass beads, pieces of d and cotton fabrics) under ordinary atmospheric ditions and at room temperature in the dark. Cul- es were made each day. Viable meningococci were overed from glass as long as ten days after drying, from wood and cotton cloth eight and seven days pectively after drying. The period of survival was rtened at 37 C. and prolonged in the ice box (6 to C.). The virulence of the viable meningococci for e was not lost. The possible bearing of this observa- n on the epidemiology of meningococcic meningitis discussed.

STOESSER, Minneapolis.

RMICIDAL ACTION OF DAYLIGHT ON MENINGOCOCCI IN THE DRIED STATE. C. PHILLIP MILLER and DORETTA SCHAD, J. Bact. **47:79** (Jan.) 1944.

In a previous study the authors showed that menin- cocci are much more resistant to dehydration than is nerally supposed and that they can survive for a ek or more in the dark. What is the susceptibility the organisms to the germicidal action of direct and fuse sunlight? The question is answered by this dy. It was found that meningococci dried in films the surface of glass, wood and cotton fabric, exposed different intensities of natural illumination and cul- ed at intervals to determine the duration of viability re killed by direct sunlight within a very few hours n when protected against overheating. On glass ds and cotton gauze they were killed by diffuse day- ht passing through two layers of glass—an ordinary ndow pane and a pyrex Petri dish—within thirty urs. On cotton toweling and on wood they died a le more slowly.

STOESSER, Minneapolis.

HE ACTION OF DETERGENTS ON STAPHYLOCOCCAL IN- FECTIONS OF THE CHORIOALLANTOIS OF THE CHICK EMBRYO. T. W. GREEN, J. Infect. Dis. **74:37** (Jan.-Feb.) 1944.

Staphylococcic infections of the chorioallantoic mem- ane of the developing chick embryo have been used a survey of the antistaphylococcic action of cationic d anionic detergents. When tested by this method, ne of the anionic agents was therapeutically active, hile most of the cationic agents did exert a demon- rable therapeutic effect.

Replacement of the chloride or the bromide ion by e iodide ion in several compounds resulted in a lower gree of therapeutic activity. Variation in the length the carbon chain (12 to 18) in the alkyl groups of homologous series of compounds resulted in no marked anges in the therapeutic effectiveness.

Because several compounds, very similar in structure d degree of germicidal action, exhibited great differ- ces in effectiveness in the egg, it is concluded that e degree of germicidal action of a compound is not a sound basis for prediction of relative therapeutic effectiveness even within such a restricted group as the cationic detergents.

The utility of the infected chick embryo as an adjunct in the evaluation of disinfectants is well demonstrated by these experiments.

TOOMEY, Cleveland.

HAEMOLYTIC STREPTOCOCCI IN THE DUST OF HOSPITAL WARDS AND THEIR RELATION TO INFECTION. DERRICK G. EDWARD, J. Hyg. **43:256** (Jan.) 1944.

A six months' study of the content of hemolytic streptococci in the dust of one adult and one children's ward was made, and the results were correlated with illness in the wards. The dust from the adult ward for patients with diseases of the nose, throat and eye contained 300,000 hemolytic streptococci per gram, and that from the children's ward, 250,000. About 33 per cent of the organisms in the adult ward were of group A, and 80 per cent of those in the children's ward were of this group. In the children's ward 27.8 per cent of 270 patients were infected with hemolytic streptococci; 12.2 per cent acquired this infection in the hospital.

Sometimes identical cultures were found first in the nose and throat of the child and later in the air. In other instances the order was reversed, which suggests that visitors were the cause of the introduction of these strains.

No conclusive example of hospital cross infection by means of dust was noted, but there was strong suggestive evidence.

JANNEY, Wauwatosa, Wis.

Metabolism; Infant Feeding; Milk, and Other Foods

A REVIEW OF HYPOGLYCEMIA, ITS PHYSIOLOGY AND PATHOLOGY, SYMPTOMATOLOGY AND TREATMENT. HAROLD E. HIMWICH, Am. J. Digest. Dis. **11:1** (Jan.) 1944.

This excellent review is most interesting because of the neuropathologic analysis of the five stages in the course of hypoglycemia based on the layers of the brain which are involved. The stages are listed as (1) cortical, (2) subcorticodiencephalic, (3) mesencephalic, (4) premyencephalic and (5) myencephalic.

The sequence is ascribed to the differences in the metabolic rates in the various regions of the brain, the highest rate being found in the newest portions and each succeeding part possessing a lower rate. Since the area with the most intense metabolic rate will be the first to suffer when energy is withdrawn, the earlier symptoms of hypoglycemia are allocated to the most recent phyletic layers and each succeeding phase is localized according to the decreasing metabolic activity in the subcortical layers. The symptoms of each phase are outlined.

With these five stages as a guide, it is possible to prevent dangerous hypoglycemia by proper treatment on recognition of the initial symptoms. An examination of the patient will reveal his stage of hypoglycemia, and carbohydrate administered at any time before the symptoms of the fifth phase have lasted too long will insure immediate recovery. Any delay after that time will render the prognosis more and more precarious.

MORRISON, Savannah, Ga.

THE RETENTION OF THE NUTRITIVE QUALITY OF BEEF AND PORK MUSCLE PROTEINS DURING DEHYDRATION, CANNING, ROASTING AND FRYING. C. E. POLING, H. W. SCHULTZ and H. E. ROBINSON, J. Nutrition **27**:23 (Jan.) 1944.

C. E. Poling and others find that the commercial canning process for cured pork shoulder slightly lowers the nutritive quality of the proteins. The proteins of dehydrated pork muscle and fried fresh pork shoulder are slightly superior in nutritive quality to those of canned cured pork shoulder, roast fresh pork shoulder and dehydrated beef muscle.

FREDEEN, Kansas City, Mo.

THE COPPER METABOLISM AND REQUIREMENT OF YOUNG WOMEN. RUTH M. LEVERTON and EMILY S. BINKLEY, J. Nutrition **27**:43 (Jan.))1944.

Ruth M. Leverton and Emily S. Binkley found that self-chosen diets of even mediocre quality contained 2.0 to 2.5 mg. of copper, which is the suggested daily allowance for young women. Additional evidence is presented in support of the theory that the body does not excrete copper and that the intestinal tract may deal with copper as it does with iron.

FREDEEN, Kansas City, Mo.

ACTIONS OF BENZEDRINE [AMPHETAMINE] AND PROPADRINE IN THE CONTROL OF OBESITY. M. L. TAINTER, J. Nutrition **27**:89 (Jan.) 1944.

Tainter concludes from his studies that the effects of amphetamine and propadrine on appetite appear to be the primary explanation of the weight-reducing power of these drugs.

FREDEEN, Kansas City, Mo.

CALCIUM AND PHOSPHORUS ABSORPTION IN BREAST FED INFANTS AND ITS RELATIONSHIP TO BONE DECALCIFICATION (RICKETS). N. L. WAKE, M. J. Australia **1**:27 (Jan. 8) 1944.

Ten of 22 breast-fed infants whose source of vitamin D was exposure to sunlight showed defective calcification of the long bones. The differences in mean absorption of calcium and of phosphorus between the infants who showed defective calcification and those whose calcification was normal were not statistically significant. These results lend support to the hypothesis that the amount of calcium stored in the skeleton during prenatal life is the major factor determining the degree of calcification that takes place in the developing bones in the first months of postnatal life.

GONCE, Madison, Wis.

Vitamins; Avitaminoses

BLOOD PLASMA ASCORBIC ACID VALUES RESULTING FROM NORMALLY ENCOUNTERED INTAKES OF THIS VITAMIN AND INDICATED HUMAN REQUIREMENTS. MARY L. DODDS and FLORENCE L. MACLEOD, J. Nutrition **27**:77 (Jan.) 1944.

Utilization values as determined by Mary L. Dodds and others in the study of daily ascorbic acid requirements of the normal human adult are shown to be close to 1 mg. of ascorbic acid per kilogram of body weight. This amount produced increased plasma ascorbic acid values for all 12 subjects studied; and 3, who had studies of urinary excretion for a thirty day period, reached saturation on such a retention.

FREDEEN, Kansas City, Mo.

INFLUENCE OF INCUBATION AT 37° C. ON STABILITY OF THIAMIN AND RIBOFLAVIN IN COW'S MILK. BARNETT SURE and ZENAS W. FORD, Proc. Soc. Exp. Biol. & Med. **54**:83 (Oct.) 1943.

When pasteurized cow's milk to which various quantities of thiamine and riboflavin had been added was incubated for forty-eight hours at 37 C. thiamine but not riboflavin was destroyed. Similar results were obtained with raw, untreated milk. Further experiments disclosed that incubating cow's milk for twenty-two hours at 37 C. produces destruction of 46 per cent of thiamine but of no riboflavin. The critical temperature for the destruction of thiamine appears to be between 31 to 37 C. The factors in cow's milk which are responsible for destruction of thiamine are stable to a temperature of 100 C. for ten minutes. The addition of milk produced destruction of 11 to 12 per cent of the thiamine, which indicates that the minerals of milk are responsible for destroying 25 per cent of the thiamine.

HANSEN, Minneapolis.

PRODUCTION OF RIBOFLAVIN DEFICIENCY IN THE MONKEY. HARRY A. WAISMAN, Proc. Soc. Exp. Biol. & Med. **55**:69 (Jan.) 1944.

Monkeys maintained on a diet free or practically devoid of riboflavin had a "freckled" dermatitis first on the face and then on other parts of the body. This condition developed in from six to eight weeks up to two to three months, depending on the type of diet previously fed. Later definite incoordination of the limbs also developed in the monkeys. The animals became pale and apathetic, and marked decrease in the hemoglobin concentration and in the red cell count was found. Adding biotin to the diet did not affect the dermatitis. Administration of riboflavin caused the dermatitis to disappear in from ten to thirty days, depending on the dose used (50 to 500 micrograms). No evidence of cheilosis or vascularization of the cornea was seen in the monkeys with riboflavin deficiency. The author does not say what happened in regard to the hemoglobin level and erythrocyte count after riboflavin was administered.

HANSEN, Galveston, Texas.

THE VITAMIN C IN THE BLOOD OF SCHOOL CHILDREN. MIGUEL OLIVER and CARMELO FAZIO, Rev. de la y med. escolar. **2**:57, 1943.

The authors studied the amount of vitamin C in the circulating blood of 113 children whose ages varied from 7 to 14 years, employing Pijoan and Klemperer's technic (titration with 2,6-dichlorophenolindophenol).

The school children, who were healthy in appearance, were pupils of the Lainez schools, situated in the poorer districts of Córdoba. Of the 113 children, 59 went to school canteens, in which food is provided by the Parent's School Cooperation Board (Comisión Nacional de Ayuda Escolar). The study was made during the autumn and winter of 1942. The samples of blood were extracted before breakfast, and the estimations were made within two hours. The investigation was completed by questioning the children as to the types of food they consumed daily.

The authors' conclusions were as follows:

1. The general level of vitamin C in the blood of the children studied was good, as shown by the average 1.120 mg. per hundred cubic centimeters of blood.

2. The principal source of vitamin C for the children studied is yerba mate (a South American shrub from whose leaves an infusion is made which is popular in Argentina).

There is no significant difference between children attend school canteens and those who do not as to level of vitamin C in the blood.

From the Authors' Summary.

giene; Growth and Nutrition; Public Health

e Hurdle Jump as a Measure of the Motor Proficiency of Young Children. Doris M. Hartman, Child Development **14**:201 (Dec.) 1943.

ecent studies have generally supported the concept pecific abilities in the motor area, in contrast to the ry of a general motor ability. However, a study Cowan and Pratt (*Child Development* **5**:107, 1934) rts that motor coordination can be measured by standard hurdle jump, which would uphold the ry of a general motor ability.

he primary objective in this study was to determine value of the standard hurdle jump as an indicator he motor proficiency of the young child. A series gross motor tests, including the hurdle jump as used Cowan and Pratt, was administered to 56 children preschool age. A coefficient of reliability of 0.88, blished by retesting, indicated this test to be one the most reliable measures. In the motor skills ed there was much individual variability in per- mance. Although the hurdle jump was positively related with each of the other tests, the coefficients e not sufficiently high to indicate that the results this test would predict the other abilities tested. low intercorrelations further suggest that, while the s have something in common, different motor ities have been sampled to a large degree. Multiple relations were computed for each test with the re- ning ones in the battery. The coefficients of corre- on obtained indicate that the other tests appear to as good single indicators of the motor abilities tested this study as the hurdle jump.

From the Author's Summary.

e Program of Medical and Hospital Care for the Wives and Families of Enlisted Men. Fred L. Adair, Illinois M. J. **84**:259 (Oct.) 1943.

For the first week ending Nov. 28, 1942, care of only patient in Illinois was authorized. For the week ing May 1, 1943, 74 applications were approved. th some weekly variation, there has been a steady rease in the number of applications. Many have been ected because the rules and the regulations state that horization cannot be retroactive. Up to May 1 funds obligated amounted to $48,505.

Care has been authorized for 616 patients of whom have been hospitalized and 53 cared for at home. e number of applications for care of infants has n only 8. The patients have been widely distributed oughout the state, in seventy-two counties. The vest number in any county was 1, and the greatest s 57.

Fifty-three hospitals and 109 physicians have par- ipated. The greatest number cared for by any one ysician is 8. The bills of these hospitals and these ysicians have been approved for payment, and some ve already been paid.

The extent of the plan cannot be calculated at this e. One cannot foretell its influence on the future actice of medicine and surgery, particularly on that obstetrics and pediatrics. The plan has the sanction d the support of Congress as a necessity during war- e. It may well set a pattern for postwar practice, at least for mothers and infants. The medical profession should give it careful consideration and assist in developing a pattern which will be helpful to the patient and the physician alike.

Barbour, Peoria, Ill.

The Static and Dynamic Physical Fitness of Adolescents. J. Roswell Gallagher, J. Pediat. **24**:81 (Jan.) 1944.

This report emphasizes the importance of the evaluation and subsequent improvement of various aspects of the physical fitness of adolescent children. Two aspects of physical fitness are considered in detail, static physical fitness, which can be estimated by a medical examination of the usual type, and dynamic physical fitness, which has to do with the physiologic response to brief strenuous exercise.

Data obtained from the initial medical examinations given a group of 910 students at a preparatory school are offered to support the opinion that a careful medical examination should be given members of this age group and that such a procedure is fruitful when it is carefully carried out and when every effort is made to correct the defects which are discovered. A table giving the incidence of abnormalities found at medical examinations of boys belonging to a privileged group is included.

A test of dynamic fitness is described, and the importance of determining the quality of the reaction to brief, strenuous work is discussed. It is emphasized that in the estimation of this aspect of fitness it is necessary to employ an exercise which actually puts the cardiovascular and respiratory systems under stress and that little valid information can be obtained if the exercise used is too mild. The value of using a test for the determination of dynamic fitness is discussed from the standpoint of deciding what is proper exercise for each person and from the standpoint of the evaluation of various programs for physical education.

Prematurity and Congenital Deformities

The Premature Infant: Management and Prognosis. W. R. F. Collis, Brit. M. J. **1**:31 (Jan. 9) 1944.

Of a small series of premature infants observed by the author 76 per cent developed perfectly, while the other 24 per cent had deformities or difficulties. The author thinks that this is sufficient proof to refute the statement that the majority of premature babies are defective either mentally or physically. He describes the care of premature infants, covering four points that are familiar to all pediatricians: first, the importance of the maintenance of normal body temperature; second, the importance of special technics of feeding, such as gavage; third the importance of special nursing technics, and fourth, the importance of prevention of infection. The only recommendation not followed routinely by most people caring for premature infants is for the use of adrenal cortical extract for the treatment of dehydration. The author says that this treatment has also proved of great value in some instances of shock at birth and in certain instances of dehydration associated with ketosis. The discussion states that there is no doubt that the measures necessary to reduce the death rate for premature infants are elaborate and complicated, but they are well worth while. Because of the high incidence of intracranial hemorrhages, it is advocated that vitamin K be given routinely, particularly to infants with mild toxemia. When a combined effort is made

by obstetricians and pediatricians, a considerable reduction of the incidence of and of the death rates attendant on premature birth should be expected.

BIRDSONG, Charlotteville, Va.

Newborn

PROBLEMS ENCOUNTERED IN EXPLAINING CERTAIN CASES OF ERYTHROBLASTOSIS FETALIS ON THE RH THEORY. AMBROSE J. HERTZOG, Minnesota Med. **26**:1057 (Dec.) 1943.

This is a good case report of a baby who died fourteen hours after birth. It was thought to have died of erythroblastosis fetalis of the icterus gravis type. However, the serologic studies did not fall in line with present theories, and the author concludes that, although the majority of cases of erythroblastosis fetalis can be explained on the basis of the Rh antigen-antibody mechanism, other known and unknown factors related to isoimmunization must be involved in those cases that fail to meet the requirements of the Rh theory. The field of isoimmunization is a fertile one for further research and hopeful simplification.

STOESSER, Minneapolis.

ERYTHROBLASTOSIS FOETALIS. GERHARD J. NEWERLA, New England J. Med. **229**:576 (Oct. 7) 1943.

A case of erythroblastosis fetalis with icterus gravis and neonatal anemia in a 9 day old infant is reported, and the recent pertinent literature and theories are briefly reviewed.

Serologic studies substantiated the fact that the Rh factor was at least one of the major causes of the illness. Colostrum was not ingested; hence this cannot account for the liberation of maternal antibodies from the fetal red blood cells in the present case.

Therapeutically, repeated transfusions of blood properly selected and cross-matched, preferably by anti-Rh serum or by Levine's modified technic, are the only successful methods. It should be stressed that Rh-negative blood is important for the infant with erythroblastosis fetalis for at least the first week after birth.

GENGENBACH, Denver.

LARGE TWINS. L. M. PARK, Lancet **1**:118 (Jan. 22) 1944.

A case is recorded of twins with a combined weight of 19 pounds 2 ounces (8,705 Gm.), the individual weights being 10 pounds 14 ounces (4,956 Gm.) and 8 pounds 4 ounces (3,749 Gm.).

LANGMANN, New York.

HEMOLYTIC DISEASE IN THE NEWBORN: THE RH FACTOR. F. A. LANGLEY and F. STRATTON, Lancet **1**:145 (Jan. 29) 1944.

Twenty-one cases of hemolytic disease of the newborn were investigated clinically, pathologically and serologically. In 19 cases an anti-Rh agglutinin was found in the maternal blood.

Of 12 necropsies, 11 showed the medullary hemopoiesis characteristic of hemolytic disease of the newborn.

The breast milk of 10 of the mothers was examined, and 7 samples were found to contain the anti-Rh agglutinin.

LANGMANN, New York.

HEMOAGGLUTINOGEN RH AND ERYTHROBLASTOSIS FETALIS: FIRST OBSERVATIONS MADE IN CHILE. HUGO VACCARO and ARMANDO MEZA, Rev. chilena de pediat. **14**:717 (Oct.) 1943.

In an investigation designed to establish statistics on the distribution of the Rh factor, it was found that 92.5 per cent of 172 Chileans selected at random ha Rh-positive blood. In 14 cases of erythroblasto studied, the "classic" Rh relationship—father and infa with Rh-positive blood and mother with Rh-negati blood—was noted.

The authors point out that repeated determination the maternal antibody titer may have diagnostic value establishing the Rh status of the fetus in utero; th are carrying out further studies on this point. Pr mature delivery or delivery by cesarian section is su gested in order to save the infant when erythroblasto can be fairly prognosticated.

PLATOU, New Orleans.

ERYTHROBLASTOSIS FETALIS AND ITS PATHOGENESIS CLINICAL OBSERVATIONS ON SIX FAMILIES. A ARIZTIA, Rev. chilena de pediat. **14**:734 (Oct.) 194

Various manifestations of erythroblastosis fetalis wer observed and recorded for 14 of 29 infants in 6 familie A fatal reaction occurred after 1 infant with Rh-positiv blood received Rh-negative maternal blood. The autho enlarges on the pathogenesis of nuclear jaundice (ker nicterus), explaining that most of the later neurologi abnormalities are related to neonatal intracrani hemorrhage.

PLATOU, New Orleans.

Acute Contagious Diseases

A PERTUSSIS TOXIN-ANTITOXIN NEUTRALIZATIO TECHNIC. MERRITT E. ROBERTS and ANNE G OSPECK, J. Infect. Dis. **74**:14 (Jan.-Feb.) 1944.

Pertussis toxin and toxoid are the best antigens fo the production of a potent antitoxic serum.

Pertussis antitoxin can be accurately standardized b in vitro toxin-antitoxin neutralization technics. Th pertussis antitoxin standard can then be used in all sub sequent tests involving the titration of toxins an toxoids.

The neutralization test can be adapted for use i testing the antitoxin titer of human serums.

The lethal effect of a toxic preparation and th necrotic effect produced by the same toxic preparatio have been shown to be due to the same toxic principl

Clinicians should be warned not to be too optimisti as yet.

TOOMEY, Cleveland.

PERTUSSIS ANTITOXIN: ITS RELATIONSHIP TO PROTEC TION IN ACTIVELY AND PASSIVELY IMMUNIZED MI AND RABBITS. ANNE G. OSPECK and MERRITT E ROBERTS, J. Infect. Dis. **74**:22 (Jan.-Feb.) 1944.

A passive protection test is described which differ entiates the protective property of antitoxin and th of antibacterial serum in mice challenged with leth doses of live culture or toxin. The duration of effecti passive protection in mice is from four to five days.

Rabbits which are actively or passively protected wit antitoxic serum can withstand several lethal doses o toxin or live culture. Most of these protected rabbi will be found to give negative cutaneous reactions whe tested with toxin or live culture.

Mice or rabbits which are actively or passively pro tected with antibacterial serum show little immuni when given challenging doses of toxin or live culture

TOOMEY, Cleveland.

FLUENCE OF THE LEVEL OF THIAMINE INTAKE ON THE SUSCEPTIBILITY OF MICE TO POLIOMYELITIS VIRUS. A. F. RASMUSSEN JR., H. A. WAISMAN, C. A. ELVEHJEM and P. F. CLARK, J. Infect. Dis. **74**:41 (Jan.-Feb.) 1944.

Mice fed diets deficient in thiamine show a lower idence of infection to Theiler's virus and to Lansing rain poliomyelitis virus than do animals fed a similar et with optimum thiamine.

If these thiamine-deficient survivors are subsequently ven adequate thiamine, paralysis develops in some of em after a prolonged incubation period.

The decrease in susceptibility noted in mice on diets stricted in caloric value but adequate in all vitamins similar to that observed in thiamine-deficient animals t is less marked. TOOMEY, Cleveland.

HE CLINICAL MODIFICATION OF WHOOPING COUGH BY THE USE OF ALUM-PRECIPITATED DIPHTHERIA TOXOID. J. MUÑOZ TURNBULL and GERARDO VARELA, J. Pediat. **24**:46 (Jan.) 1944.

Experimental study led to the following conclusions:

1. The rabbit is better protected with a mixture of rtussis vaccine and alum-precipitated diphtheria toxoid an with pertussis vaccine alone against live Bacillus rtussis injected intradermally.

2. Pertussis vaccine alone protects the rabbit if the ccine is prepared according to the technic of Kendrick.

3. Diphtheria toxoid alone does not protect the rabbit.

Of 54 children with whooping cough treated with phtheria toxoid precipitated in alum, 37 improved thin two weeks after the beginning of the spasmodic ugh and 11 within three weeks, while 6 children owed no improvement.

FROM THE AUTHORS' SUMMARY.

HE EFFECT OF RACHITOGENIC DIETS, PARTIAL INANITION, AND SEX ON THE RESISTANCE OF COTTON RATS TO THE VIRUS OF POLIOMYELITIS. H. M. WEAVER, HELEN AMMON and NORMA HASTINGS, J. Pediat. **24**:88 (Jan.) 1944.

The results of twenty-one experiments designed to t the influence of rachitogenic diets, partial inanition d sex on the susceptibility and on certain immunologic sponses of cotton rats to the virus of poliomyelitis are ported. With two exceptions, each experimental oup of animals consisted of 24 cotton rats (6 rachitic d 6 normal males and 6 rachitic and 6 normal females). During the present investigation suspensions of the rmstrong-Lansing strain of the virus of poliomyelitis re injected or instilled in varying quantities into the rebrum, stomach, colon, peritoneal cavity, external res, primary bronchi and blood, beneath the skin of e back and beneath the mucous membranes in the gions which in certain animals other than cotton rats use the palatine tonsils. In addition, the animals of e experimental group were allowed to remain in inate contact with cotton rats which were dying from e effect of intracerebral inoculation with the virus. nally each cotton rat of still another experimental oup was fed the brain stem and spinal cord freshly moved from a cotton rat paralyzed with poliomyelitis. Each of the cotton rats which failed to exhibit ralysis after an experimental inoculation with the rus was subjected to three-way reinoculation with the rus at intervals of twenty-five days.

The results of the experiments reported in this communication yield no evidence indicating that avitaminosis partial inanition or the sex of the animal affects significantly the susceptibility of cotton rats to the Armstrong-Lansing strain of the virus of poliomyelitis. Furthermore, there was no indication that the development in cotton rats of resistance to three-way reinoculations with the virus, when the latter were administered subsequent to any of the experimental inoculations, is influenced by avitaminosis D, partial inanition or sex.

AUTHORS' SUMMARY.

DIPHTHERIA IMMUNIZATION. HERBERT W. SWANN, Brit. J. Child. Dis. **41**:10 (Jan.-March) 1944.

In 1942 about 50 per cent of all children in Great Britain were immunized against diphtheria (about 35 per cent of those under the age of 5).

As a general rule alum-precipitated toxoid is used, in two injections, of 0.2 cc. and 0.5 cc. respectively.

All children should be given the Schick test about every two years until they reach the age of at least 10 years. LANGMANN, New York.

POLIOMYELITIS: EXPERIMENTAL WORK IN EGYPT. C. E. VAN ROOYEN and A. D. MORGAN, Edinburgh M. J. **50**:705 (Dec.) 1943.

The authors studied 74 cases of poliomyelitis with 19 deaths and 32 cases with 14 deaths occurring in the military forces in the Middle East in 1941 and 1942 respectively. In the native population of 16,000 there were apparently only 11 cases. The authors present in detail clinical, histopathologic and experimental studies on 7 patients who died and from whom 6 different strains of poliomyelitis virus were isolated. Experimentally, the Abyssinian baboon, Papio hemadryas, proved to be exceptionally susceptible to infection and was used and recommended by the authors. Inoculation with emulsified spinal cord obtained at autopsy caused reproduction of the disease and death of the animal in three to eight days.

The histopathologic studies are particularly interesting in that they revealed involvement of areas of tissue of which there was no clinical evidence prior to death. Involvement of gray matter from the lumbar area of the cord to the midbrain, with extensive infiltration with polymorphonuclear cells in fulminating lesions and of lymphocytes in nonfulminating lesions was observed. Lesions in the substantia nigra, hypothalamus, cerebral cortex and celiac ganglions are described.

The question is raised as to the possibility that atypical poliomyelitis occurred in 20 patients who had conditions diagnosed clinically as multiple neuritis, radiculitis, syringomyelia, lymphocytic choriomeningitis and encephalitis.

Experimentally the authors found that sodium sulfadiazine failed to prevent or arrest the course of the disease in an inoculated animal.

NEFF, Kansas City, Mo.

THE LABORATORY DIAGNOSIS OF DIPHTHERIA: A NOTE ON SOME PRESENT DAY METHODS. HELEN A. WRIGHT, Edinburgh M. J. **50**:737 (Dec.) 1943.

The author states that the biologic distinction between Corynebacterium diphtheriae and related nonpathogenic species is not always sharp. Consequently, the diagnosis could be confirmed in only 33 to 55 per cent of the cases reported as instances of diphtheria. Not the clinically well developed but the milder forms cause this problem. False positive reports will be minimized if stained films of organisms grown on Loeffler's medium and of organisms from an eighteen to twenty-four hour culture on a medium containing tellurite are used in combination. There is considerable discussion of the

stains and culture mediums, and of the character of growth. Subculturing of the organism every three to four weeks is recommended in order to maintain characteristic colonies as controls.

NEFF, Kansas City, Mo.

THE PROPHYLAXIS OF SCARLET FEVER IN THE SCHOOL CHILD IN RELATION TO MODERN METHODS OF IMMUNIZATION. JUAN M. MIRAVENT, Rev. de hig. y med. escolar. **2**:42, 1943.

Recent investigations reported by several North American authors provide new resources for specific prophylactic measures against scarlet fever and a more solid basis for general prophylaxis. However, the improvement of methods of vaccination has not led to a simple solution, which would mean total immunization or at least immunization of the persons who according to the Dick test are most susceptible. All methods, especially those most commonly used, are inconvenient, mainly because of the number of injections (five or more) and because of the reactions to the vaccine which are sometimes severe.

Miravent states that the use of scarlet fever toxoid, common in several countries and recommended by him since 1929, makes immunization easier by reducing the number of injections required and the incidence of reactions. The common practice of giving three doses is approved by the author; this dosage will produce good immunization in most susceptible persons, although not complete in all. Naturally the use of a greater number of doses will reenforce the immunity.

All the author's investigations prove that vaccination against scarlet fever has not yet reached the level, attained by some other vaccinations, which permits discarding of other general prophylactic procedures. It cannot be the basis of prophylactic campaigns, but it is of great importance when because the disease is widely epidemic or exceptionally severe it is necessary to act with more efficiency, disregarding the disadvantages inherent in the method. For these reasons the author prefers the use of attenuated toxin, as he has mentioned in previous papers.

General methods of prophylaxis must be carefully applied according to the circumstances.

With the goal of making all prophylactic campaigns comprehensive and appropriate to the determining causes, the author has investigated some of the particular problems of preventive measures applicable in the schools and the possibilities of carrying prophylactic procedures into the homes.

FROM THE AUTHOR'S SUMMARY.

Acute Infectious Diseases

TREATMENT OF EPIDEMIC DIARRHEAS AND DYSENTERIES IN INFANTS AND YOUNG CHILDREN. KURT GLASER and JAMES W. BRUCE, J. Pediat. **24**:53 (Jan.) 1944.

A study of different methods of treatment of diarrhea was made by statistical evaluation of the courses of patients admitted and treated at the Louisville General Hospital over a test period of five years (1938-1942).

The types of diarrhea were classified in two groups, one including nutritional diarrhea and the types caused by parenteral infection and the other including the types caused by specific organisms of the dysentery group.

A twelve hour period of starvation, with only water and medicine given by mouth, was started when the patient was admitted to the hospital, with the idea of providing rest for the intestinal tract. Dehydration was combated by oral and intravenous administration of fluid. Sterile water was forced orally every fifteen to ti minutes. Solutions of chlorides or of dextrose given intravenously, as needed, in instances of dehy tion. Intravenous administration of plasma or tr fusions of blood after reduction of the hemoconce tion, were found highly effective. Sulfathiazole was in treating the nonspecific types and sulfaguanidine treating the specific types of diarrhea. Compounds bismuth and camphorated tincture of opium were only for patients in whom the infection was resistant treatment. Polyvalent dysentery antiserum was gi to 1 patient.

The dietary measures used deviated from those f are customary. The amount of feeding was neit limited nor forced, and the orders read, for insta "Buttermilk as tolerated," or "Skimmed boiled m ad libitum." From the statistical tables included in article the following conclusions could be drawn: (The children took large amounts of milk per feedi (2) the children regulated their intake according their appetites and without harm to the progress recovery; (3) when too large amounts were offered, t children limited the intake according to the appet and (4) improvement was rapid and recovery occurr earlier than in patients treated by other methods t and more years earlier. The death rate was lower th in previous years.

This form of diet has several advantages. A re tively large caloric intake by the sick and weaken child is achieved by our method in spite of the l caloric value of the foods used. Calculated amounts this low caloric food would be extremely high, a forcing the intake would be harmful to the conditi of the patient. The simplification of the treatment patients in the hospital and particularly at home, wi untrained personnel, is considerable.

The forms of milk used during the test period in 19 were buttermilk, skimmed boiled milk and protein mil The use of whole boiled milk, with or without sug and of formulas made with evaporated milk was aba doned because of the higher amount of dextrose and t slightly laxative effect.

When diarrhea had ceased, as determined by t character of the stools, a gradual return to the norm formulas, by replacing fractions of the average amou of buttermilk taken per feeding, was made.

GLASER, Milwaukee.

PROBLEMS IN MANAGEMENT OF RHEUMATIC DISEAS IN CHILDHOOD. LEO M. TARAN, J. Pediat. **24**: (Jan.) 1944.

The author's studies, based on the natural history rheumatic disease, bear a realistic relationship to th management of the disease. If the primary aim treatment is prevention of cardiac damage and prolong tion of life expectancy, it seems that the manageme of rheumatic disease would have to be planned on th basis of the age of the patient and the severity of th infection at the time of the onset of the disease. Th younger the child at the time of onset and the mor severe the initial attack, the more frequent will be th recurrence, the longer the duration of the active infec tion and the greater the resultant cardiac damage.

Since rheumatic disease is not reportable, it is in th main outside of the jurisdiction of hospital and healt authorities. The care of children with this disease a present is unsatisfactory and fragmentary. It lies in th hands of private institutions, convalescent homes, mu nicipal hospitals and child health agencies, each of whic has its own methods and is unrelated in most instance to the other agencies.

The management of this disease demands active mobilization of all public and private agencies concerned with the health and welfare of children. To make such mobilization effective one must find a method of coordinating all these efforts. Since such coordination does not exist in the present planning for health and welfare, a new approach is warranted.

TARAN, Brooklyn.

THE USE OF SULPHAGUANIDINE IN BACILLARY DYSENTERY. ANGUS E. BREWER, Brit. M. J. **1**:40 (Jan. 9) 1944.

Seventy-seven persons with bacillary dysentery were treated with sulfaguanidine. Twenty-six had acute attacks, and 51 had chronic infections. Of the 26 acute attacks, 16 were caused by Shiga's bacillus, 6 by Flexner's bacillus and 4 by unidentified bacilli. Of the 51 chronic infections, 20 were due to Shiga's and 14 to Flexner's bacillus, and the organism responsible for 17 was not determined.

Patients were put to bed, rested and warmed. The frequency and character of the stools were noted, and specimens were plated and examined microscopically. Diet was limited to fluids during the first twenty-four hours. A large intake of fluid by mouth was encouraged in the early stages to replace lost fluid. No intravenous administration of fluid was necessary. Adjuvant treatment was given, patients with Shiga infection receiving 30,000 units of antiserum. A preliminary treatment consisting of colonic irrigations combined with low residue diet was carried out for 19 patients.

Patients with acute infections received an initial dose of 7 Gm. of sulfaguanidine, followed by doses of 3.5 Gm. every four hour intervals. In severe attacks 3.5 Gm. was given two hours after the initial dose, followed in two hours by 3.5 Gm. more. Usually sulfaguanidine was given until two days after the stools had become normal. Patients with chronic infections received 17.5 Gm. of sulfaguanidine daily, in five doses, for a minimum of eight days, the length of treatment being increased with the severity of the attack. For chronic infections sulfaguanidine must be given until healing of the mucosa has taken place; to gage this sigmoidoscopy is essential.

Complete cure was obtained in 19 (73 per cent) of the patients with acute infections, in 11 (55 per cent) of those with chronic infections receiving 90 Gm. during six days and in 25 (77 per cent) of those with chronic infections receiving an average of 160 Gm. during ten days. Toxic symptoms occurred in only 9 of the 51 patients with chronic infections and in none of those with acute attacks.

BIRDSONG, Charlottesville, Va.

PROBABLE TETANUS DESPITE INOCULATION WITH TOXOID. R. J. MCGILL, Brit. M. J. **1**:40 (Jan. 9) 1944.

Preliminary reports on battle casualties seem to vindicate the administration of two doses of tetanus toxoid at an interval of six weeks. In the British Expeditionary Forces in France and Flanders no tetanus developed in any of the wounded men who had been so inoculated.

One case history reports that tetanus developed in a 20 year old youth who had received tetanus toxoid, but the diagnosis could not be confirmed bacteriologically, the two other possible diagnoses being rabies and poisoning due to strychnine. In the comment the author states that if the patient had tetanus the two protective inoculations had not even sensitized the reticuloendothelial system and the stimulus of the toxin from the wound produced no increase of antitoxin. He states that, because this is possible, the present practice of giving antitoxin to all wounded men, irrespective of previous inoculation with toxoid, should be continued.

BIRDSONG, Charlottesville, Va.

A CUTANEOUS REACTION TO THE INFLUENZA VIRUSES. W. I. B. BEVERIDGE and F. M. BURNET, M. J. Australia **1**:85 (Jan. 29) 1944.

Intradermal inoculation of a 1:10 dilution of unheated or boiled allanotic fluid infected with influenza virus A or B produces a cutaneous reaction in most adults. The degree of the reaction bears no relation to the antibody titer of the serum. Of 31 children similarly tested, 18 had cutaneous reactions, and all of the children but 1 were shown by serologic tests to have been infected in the past by the corresponding viruses. However, many children who had positive reactions to serologic tests failed to exhibit appropriate cutaneous reactions. The suggestion is made that allergy to the virus may play a part in resistance to infection and in the production of symptoms when infection occurs.

GONCE JR., Madison, Wis.

Chronic Infectious Diseases

SENSITIVITY TO TUBERCULIN IN CONGENITAL TUBERCULOSIS. CARLOS A. URQUIJO, Arch. argent. de pediat. **21**:38 (Jan.) 1944.

The author studied the sensitivity to tuberculin of 7 infants with congenital tuberculosis who lived thirty-eight to two hundred and forty-five days. Three of the infants did not show positive reactions to tuberculin. The author ruled out, after extensive consideration, the possibility that the lack of response to tuberculin could be the result of a preallergic state or terminal anergy and attributed it to poor sensitivity of the infant's skin.

The absence of a reaction to tuberculin could be related to the strong hydrophilia of the skin of the infant. Tuberculin must stay in contact with the skin during a minimum time in order to cause the characteristic local irritation. The skin is more strongly hydrophilic during the first month of life; therefore the tuberculin enters the general circulation more rapidly. The period of contact being shortened, reaction is apt to be negative or only faintly positive.

The author is aware that this theory is not a complete explanation of the phenomenon, but he states the belief that hydrophilia of the skin plays an important role.

CASSORLA, San Francisco.

Diseases of Blood, Heart and Blood Vessels and Spleen

THE DETRIMENTAL EFFECT OF FREQUENT TRANSFUSIONS IN THE TREATMENT OF A PATIENT WITH HEMOPHILIA. F. L. MUNRO and HAROLD W. JONES, Am. J. M. Sc. **206**:710 (Dec.) 1943.

The authors report that in a person with hemophilia who had received numerous transfusions during the past three years the beneficial effect of transfusions has become questionable, and they suggest that they may have become detrimental.

The failure of repeated transfusions to produce any improvement in the condition of a person with hemophilia is described and a possible explanation offered.

HENSKE, Omaha.

AN EVALUATION OF ROENTGEN STUDIES IN HEART DISEASE IN CHILDREN. S. P. DITKOWSKY and EDWIN RYPINO, Illinois M. J. **84**:367 (Dec.) 1943.

In a clinical and roentgen study of 532 children at the Illinois Soldier's and Sailor's Children's School the authors found that abnormal cardiac contour denotes cardiac disease but that cardiac disease may exist without producing roentgen changes. Deviation of the esophagus cannot be demonstrated in many children who have evidence of mitral disease. Progressive roentgen studies of the heart offer objective criteria for the evaluation of the status of a convalescent patient. Roentgen examination is an important aid in the diagnosis of heart disease, as the typical auscultatory signs may be absent or overlooked.

BARBOUR, Peoria, Ill.

SECONDARY ANEMIA DUE TO PROLONGED AND EXCLUSIVE MILK FEEDING AMONG SHOSHONE INDIAN INFANTS. M. PIJOAN and C. A. ELKIN, J. Nutrition **27**:67 (Jan.) 1944.

Pijoan and Elkin made their observations on a group of Shoshone Indian infants, who by custom were fed an exclusive milk diet until such time as the child could partake of the regular diet consumed by the adults. The resultant anemia was secondary to the iron deficiency. A modification of Elvehjem's method for determining the iron content of milk was introduced.

FREDEEN, Kansas City, Mo.

DISEASE OF BLOOD IN INFANTS AND YOUNG CHILDREN, INCLUDING THE HEMORRHAGIC STATES. H. G. PONCHER, J. Pediat. **23**:680 (Dec.) 1943.

The broader clinical aspects of diseases involving the blood and the blood-forming organs constitute an important part of the daily practice of every pediatrician. Apart from the well recognized diseases of the blood-forming organs the daily work of the practicing physician in clinical hematology is concerned with well defined reactions to a large variety of stimuli which act on the circulating blood cells or on the blood-forming organs.

While it is true that the general nature of the etiologic agents which affect the blood and the blood-forming tissues of adults and children may be the same, in children the reaction of these tissues may be quite different. This difference is a product of the anatomic aspects and the functional response of the blood-forming organs that are found in childhood. Some of these may be enumerated as follows: (1) wide distribution of the blood-forming tissues, (2) rapid expansion of the blood volume, (3) rapid response of the blood-forming tissues and (4) the nature of the response of immature tissues to certain stimuli, such as infection.

Anemia in infants and children has occupied the major interest of the clinician and the investigator, and most of the progress that has been made has been the result of a more rational understanding of the pathogenesis of this symptom. It is therefore essential that the physician have a practical understanding of the interrelationships of several physiologic processes which are concerned with the maintenance of a normal peripheral blood supply. These processes are the synthesis of hemoglobin, the regeneration of the cellular elements in the blood-forming organs and the maturation of these products, the destruction of blood cells and hemostasis or the maintenance of an intact vascular system.

Anemia during infancy and childhood as well as during any other period of life may result from a disturbance of any one or a combination of two or m of such processes.

Disorders involving the leukopoietic tissues are as circumscribed as we formerly believed. More quent use of sternal marrow aspiration has also sho that granulocytopenia may be associated with a h plastic, hyperplastic (with maturation arrest) or a plastic marrow. The prognosis is more favorable those cases in which leukopenia and granulocytope are on the basis of arrest of maturation if the case recognized early enough and the causative factor moved to avoid secondary complications due to longed depression of the functional elements of defe Acute leukosis in infants and children may be leu penic throughout the entire course of the disease, some of the mononuclear cells often designated lymphocytes are immature cells of mistaken identi Study of the sternal marrow in a questionable case leukosis is a more conclusive aid in diagnosis.

Bleeding from free surfaces or into the tissues m result from a gross deficiency of any single factor lesser deficiencies in a combination of factors. T factors of clinical importance are the integrity of t capillaries, the composition of the plasma and t quantitative and functional state of the platelets.

The use of standardized laboratory tests will m terially aid effective diagnostic evaluation of the pati with hemorrhagic disease.

Clinicians have often expressed the desirability having an accurate index for the selection of patie with essential or idiopathic thrombopenic purpura w will respond favorably to splenectomy. We have fou that the megakaryocytic pattern of the bone marrow revealed by sternal aspiration offers such assistan when considered with the other symptoms and signs.

Vitamin K as a therapeutic substance has a speci but limited field of use confined to those conditions which the clinical manifestations are the result of p thrombin deficiency. In cases of extensive damage the liver the therapeutic value of vitamin K is limit and transient.

Transfusions of freshly drawn blood still remain t treatment of choice in hemophilia. It is not general appreciated, however, that small amounts of blood a effective in producing mild to moderate prolongation the coagulation time. When the physician has a pers with hemophilia under his care it may be practical t conserve his supply of donors by giving 50 to 100 c of blood instead of large transfusions unless the lat are indicated because of anemia and reduced volu of blood. Instead of waiting for clinical symptoms hemorrhage to develop, one may study the coagulati time at routine intervals and give small amounts blood to keep the rate of coagulation as close to norm as possible.

The recent work on "vitamin P" (citrin) should b closely followed for its place in the management of t hemorrhagic state. As in the case of vitamin K a other factors which play a specific but limited role i the maintenance of the normal hemostatic equilibrium its role will be established only by critical evaluation Its effect appears to be on the vascular factor and n on the intravascular clotting mechanism.

PONCHER, Chicago.

BLOOD TYPING AND CRITERIA FOR BLOOD-TYPIN SERUMS. WILLIAM THALHIMER, J. Pediat. **23**:71 (Dec.) 1943.

1. Blood typing should be performed only with hig titered, rapidly acting, standardized anti-A and anti-B serums.

. The typing serums should be checked at frequent rvals with known type A and type B cells.

. The blood type ascertained by the use of the red s of the subject and standardized serums should be cked by testing the subject's serum or plasma with wn type A and type B cells.

. Pretransfusion tests should include direct cross iching of the patient's and the prospective donor's s and serum or plasma.

. Pregnant or recently pregnant women with Rh- ative blood who need transfusions should receive y compatible Rh-negative blood.

. If any person, man, woman or child, has had or is ng to need repeated transfusions, one should deter- e whether his blood is Rh negative or positive. If is Rh negative, additional transfusions or repeated nsfusions are safer if performed only with compat- Rh-negative blood. THALHIMER, New York.

SCULAR FRAGILITY AND PERMEABILITY AS INFLU- ENCED BY VARIOUS AGENTS. GEORGE J. MAJOVSKI, A. J. LESSER, HOMER C. LAWSON, HERBERT O. CARNE and C. H. THIENES, J. Pharmacol. & Exper. Therap. **80**:1 (Jan.) 1944.

Other observers have noted that certain substances, ecially extracts of citrus fruits, lessen capillary morrhage in animals. The effective substance was led vitamin P by Szent-György. The present authors nd that "when air is suddenly evacuated from a jar which mice are placed hemorrhage occurred in the gs of these mice." It was found that a water-soluble ract of lemon peel and crude hesperidin from oranges orded protection to mice against this hemorrhage for to four hours after administration, while pure hes- idin increased the bleeding. PILCHER, Cleveland.

EUDOTUMOR OF BONE IN HEMOPHILIA. ARTHUR P. ECHTERNACHT, Radiology **41**:565 (Dec.) 1943.

A case of hemophilia with destruction of a portion the tibia just distal to the epiphysis simulating a nor is reported because of its rarity.

A boy aged 13, with a long history of repeated morrhages in various joints, causing pain and swel- g, was readmitted to the hospital because of a painful elling over the anterior surface of the left leg below knee and loss of weight and appetite of three weeks' ration. The temperature was 100 F., and the pulse e was 102.

The blood contained 10 Gm. of hemoglobin per hun- ed cubic centimeters and 4,300,000 red cells, 7,700 ite cells and 473,760 platelets per cubic millimeter. e differential count was normal. The clotting time s six minutes and the bleeding time two minutes. ine and Mazzini tests gave negative results. The ne was normal.

Roentgenograms of the left knee showed (1) de- uction of the cortex and underlying cancellous bone the anterior aspect of the proximal third of the ia, with undermining of the tibial tuberosity, (2) ckening and elevation of the periosteum, with "cuff" rmation on the anterior and lateral aspects of the ia at the level of the lower limits of the overlying ft tissue tumor, (3) deepening of the intercondylar tch of the femur and (4) evidence of subchondral crosis in the condyles of the femur. The general pression was that of old hemarthrosis or of sarcoma the tibia.

In addition to roentgen therapy small daily blood nsfusions and symptomatic treatments were given. e increase in the size of the tumor was apparently arrested for a few days, although other hemorrhagic lesions appeared over the body.

The final diagnosis was "large subperiosteal hema- toma with massive necrosis of the underlying bone with necrosis and infection of the overlying skin.

Hemophilia may cause subperiosteal hemorrhages with resultant proliferation and thickening of the peri- osteum, erosion of the underlying cortex and cancellous bone and organization and calcification of the hematoma, producing roentgen changes resembling sarcoma of bone.

Three similar cases from the literature are briefly reviewed. ANSPACH, Chicago.

THE RH CONSTITUENT OF THE HUMAN RED BLOOD CELL. S. D. S. GREVAL and A. B. ROY CHOWDHURY, J. Indian M. A. **13**:65 (Dec.) 1943.

In a study of 200 Indians in Calcutta, Greval and Chowdhury found that the Rh factor was present in 90 per cent. The testing serum was prepared from a rabbit. The results were suggestive of a quantitative rather than a qualitative difference. The reactions with 1:10 and 1:25 dilutions of the testing serum indicated that the Rh factor was present in abundance in only 3 subjects (1.5 per cent) and absent from only 2 (1 per cent). In the absence of tests with anti-Rh human serum from isoimmunized mothers, which may give more clearcut reactions, evidence in favor of absolute presence or absence of a new antigen similar to A and B or even to M and N cannot be held to be striking or even inferentially convincing.

GONCE JR., Madison, Wis.

THE RH FACTOR: ITS INCIDENCE IN A SERIES OF VICTORIAN RED CROSS DONORS. R. T. SIMMONS, J. J. GRAYDON, R. JAKOBOWICZ and L. M. BRYCE, M. J. Australia **2**:496 (Dec. 18) 1943.

Samples of blood from 3,641 adult white persons were examined for the Rh factor by means of the slide technic, a high titer human anti-Rh serum being used; the blood of 643 (17.66 per cent) of these persons was found to be Rh negative. When samples of blood from these persons were retested with 5 other human anti-Rh serums, 20 gave positive results with one or more of the serums. These results indicate that the Rh factor is not a single entity and that different human anti-Rh serums give results, which, although substantially in agreement, show occasional discrepancies. A difference found by the authors between the percentage of subjects with Rh-negative blood in group A and in other groups suggests that the Rh factor may not be entirely independent of the A and B agglutinogens.

GONCE, Madison, Wis.

THE CALCIUM, PHOSPHORUS AND PROTEINS OF THE BLOOD OF SCHOOL CHILDREN OF CORDOBA. HECTOR ORDOÑEZ FERREYRA, Rev. de hig. y med. escolar. **2**:65, 1943.

In an investigation of the amount of protein, calcium and phosphorus in the blood of 100 children from the different quarters of Córdoba who attend Lainez' Schools, the author obtained exceedingly low general averages, especially for total proteins, for which the average obtained was below the minimum accepted as normal. The level of calcium, which was near the minimum normal value, represented a balanced physiologic condition. The general average for phosphorus was low, but none of the values were extreme.

The results indicate that the children tested, who appear to be in good health, have a measurable organic

deficit. This fact was already noted in the comparative stature tables prepared in connection with the statistical study of nutrition.

Values nearest to the normal level were found in children attending school canteens or belonging to families of medium standard of living, which allows them sufficient nourishment. The cost of food of high protein value prevents the lower classes from obtaining it and from giving it daily to their children in the required amount. Thus, lack of nourishment is a primary factor, independent of the other factors, which are worthy of consideration, such as environmental conditions, individual susceptibilities which condition the appetite and pathologic states which may have been overlooked during clinical inspection.

FROM THE AUTHOR'S SUMMARY.

Diseases of Nose, Throat and Ear

THE EFFECT OF DAMAGE TO THE TRACHEAL MUCOSA ON THE DRAINAGE OF RESPIRATORY TRACT FLUID. ELDON M. BOYD, W. F. PERRY and MARY E. T. STEVENS, Am. J. Physiol. **140**:467 (Jan.) 1944.

This paper is concerned chiefly with the part played by ciliary movements in the excretion of respiratory tract fluid. The authors observed that when the ciliated mucosa lining the trachea of rabbits and cats is damaged by inhalation of ammonia or live steam the output of respiratory tract fluid is doubled or tripled when the animals are posturally drained, but drainage is incomplete and at about the normal rate when the animals are not posturally drained. They conclude that other mechanisms besides ciliary drainage are geared to handle not more than the normal load of respiratory tract fluid.

When the output of the fluid in rabbits and cats is doubled or tripled by giving cholinergic drugs or by faradic stimulation of the cervical vagus nerve, this output is not augmented by postural pulmonary drainage, and the ciliated mucosa is undamaged. The conclusion is reached that the ciliary drainage mechanism can handle loads of respiratory tract fluid greater than the normal. In sick cats and dogs with a normal tracheobronchial mucosa but with a congestion of the pulmonary alveoli postural drainage did not help much. In these animals the reserve capacity of the cilia to excrete respiratory tract fluid was great. These laboratory observations should become of clinical value.

STOESSER, Minneapolis.

CLINICAL NOTES: NEW INSTRUMENTS AND TECHNICS. USE OF A T TUBE FOR DRAINAGE OF A SEPTAL ABSCESS. FRANCES L. WEILLE and ELIZABETH DE BLOIS, Arch. Otolaryng. **39**:85 (Jan.) 1944.

Described in this article is a simple method of draining a septal abscess by the employment of the T tube, well known in the surgery of the bile ducts. A photograph is given of the small T tube which is recommended and of a modification of it for actual use.

GREENWOOD, Chicago.

USE OF CRUDE PENICILLIN IN MEDIA FOR THE ISOLATION OF HEMOPHILIS INFLUENZAE FROM LARYNGEAL CULTURES IN OBSTRUCTIVE LARYNGITIS. LILLIAN BUXBAUM and NICHOLAS F. FIEGOLI, J. Bact. **46**: 543 (Dec.) 1943.

The syndrome of laryngotracheobronchitis has been attributed to Haemophilus influenzae. The organism has been isolated frequently but often with difficulty. The authors stress the importance of identification of the causative micro-organism in this disease in order that proper treatment may be instituted. The material removed from the larynx and trachea for bacterial study has been found to contain gram-positive cocci, the overgrowths of which make it difficult to isolate H. influenzae. After the publications of Fleming concerning the antibacterial action of filtrates of Penicillium notatum it was observed that the addition of crude penicillin to blood agar plates provides a simple but excellent medium for the isolation of H. influenzae from mixed cultures usually obtained from the larynx. The authors obtained typical growths of H. influenzae from the penicillin mediums in practically pure cultures. It was found that these cultures could be used without further transplants for serologic identification and for testing the patient's antibody. The suggestion is made that the ease of preparation of these penicillin plates with stock laboratory mediums used as a base, makes them convenient in a busy diagnostic laboratory.

STOESSER, Minneapolis.

DIADOCHOKINESIS IN STUTTERERS AND NON-STUTTERERS. CHARLES R. STROTHER and LOIS SMASON KREIGMAN, J. Speech Disorders **8**:323 (Dec.) 1943.

Fifteen adult stutterers, 11 men and 4 women, were compared carefully with a control group of approximately the same distribution for sex, dextrality quotient and rhythm. The authors were unable to confirm the previous studies of Blackburn, Rotter, West and Cross; no significant differences between stutterers and non-stutterers were found in respect to rate of diadokokinetic movement of the lips, tongue, jaw or fingers.

PALMER, Wichita, Kan.

THE ETIOLOGY OF STAMMERING: THE PSYCHOPHYSIOLOGIC FACTS WHICH CONCERN THE PRODUCTION OF SPEECH SOUNDS AND OF STAMMERING. ELMER KENYON, J. Speech Disorders **8**:337 (Dec.) 1943.

The author reviews the psychophysiologic facts of laryngeal action and the production of sound and states his theory that stuttering is a result of compulsive interpolation of normal adduction of the vocal cords when phonation is attempted.

PALMER, Wichita, Kan.

HIGH FREQUENCY DEAFNESS AND DISCRIMINATION OF "HIGH FREQUENCY" CONSONANTS. ROBERT PLUMMER, J. Speech Disorders **8**:373 (Dec.) 1943.

A test of aural discrimination, involving fifteen so-called high frequency consonants, was administered to 399 college students. From this group 52 persons were selected to represent a scale of distribution from poorest to best. Nine of the 52 students were found to have loss of hearing for high frequencies. Three had general loss of hearing. The 9 persons with loss of hearing for high frequencies had no appreciable difficulty in discriminating between the high frequency consonants; the 3 with general loss did have such difficulty. Discrimination of the sounds of specific consonants did not appear to be dependent on sensitivity to specific frequencies in the higher ranges.

PALMER, Wichita, Kan.

VOWEL QUALITY IN UNSTRESSED SYLLABLES IN AMERICAN ENGLISH. LEE S. HULTZEN, Quart. J. Speech **29**:451 (Dec.) 1943.

Vowels in unstressed syllables in English may be treated in three ways: they may be unobscured, partially obscured or fully obscured.

PALMER, Wichita, Kan.

EXPERIMENTAL MILITARY SPEECH CORRECTION PROGRAM. SEVERINA E. NELSON, D. P. MCKELVEY, NAOMI HUNTER and MARJORIE WALTER, Quart. J. Speech **30**:8, 1944.

f 682 cadets in the Reserve Officers Training Corps, per cent experienced difficulties of speech in the formance of duties in the corps. Most of these orted tired throat or husky voice. The defective ups had lower spirometric measurements than the ers. Six hundred and ninety-two additional cadets e tested in an auditorium by two clinicians. Forty- and eight-tenths per cent had one or more diffi- ies in speech of a minor sort. During a semester raining in speech 38.2 per cent of those with diffi- ies of speech showed good improvement.

PALMER, Wichita, Kan.

ECH GAMES FOR CHILDREN. DORIS G. YOAKAM, Quart. J. Speech **30**:85, 1944.

Parlor games involving speech cost little and interest dren greatly in speech. They may be utilized to e drills in speech fun, but they should always be d for the benefits connected with the drills.

PALMER, Wichita, Kan.

iseases of the Gastrointestinal Tract, Liver and Peritoneum

ARRHEAL DISEASES. GEORGE CALLENDER, Am. J. Trop. Med. **24**:7 (Jan.) 1944.

The author discusses briefly the history of diarrheal eases and the various causes. He also mentions the ious types of treatment now employed and prophy- ic measures of proved value.

BURPEE, Augusta, Ga.

DICAL PROGRESS: PANCREATIC INSUFFICIENCY AND THE CELIAC SYNDROME. SIDNEY FARBER, New England J. Med. **229**:653 (Oct. 21) 1943.

The features that characterize the celiac syndrome lude typical wasting, more of the limbs than of the e; distention of the abdomen, which may be soft, ghy and inelastic or greatly distended and tight; ky, foul-smelling, frothy stools that contain excess and often retardation of growth. To these may be ed a clumping of barium in the small intestine, a dextrose tolerance curve and a low rise in the el of vitamin A in the blood during the vitamin A orption test. These symptoms may appear as a ult of congenital malformation of the small intestine its attachment, chronic infection, dysentery, mega- on or pancreatic insufficiency. True or idiopathic iac disease is used to describe this group of symptoms d the laboratory findings in patients in whom no derlying disease can be found and who are improved d usually cured by good general care and any one the well established celiac diets. Three groups of es of pancreatic insufficiency are described as follows:

Group 1.—The term "meconium ileus" is used to scribe intestinal obstruction in the newborn infant used by the inability of the intestine to propel through lumen a thick, mucilaginous meconium, the altered ysical state of which is explained by the failure of ncreatic enzymes, particularly trypsin, to act on it ring intrauterine life. Death has occurred almost in- riably in infants with this severe type of intestinal struction. Lesser degrees of obstruction may be pro- ced by inspissated meconium unassociated with pan- eatic achylia, as in stenosis of the ileocecal valve. stmortem examination of patients with true meconium ileus reveals pancreatic fibrosis with obstruction to the outflow of secretions, proved in some cases to be caused by congenital atresia or stenosis of the main pancreatic ducts.

Group 2.—Andersen found that in the cases of this group the patients usually died before 6 months of age and that many of them presented feeding problems characterized by hunger, failure to gain weight and foul, bulky stools. A somewhat different summary was given by Blackfan and May, who recognized that the clinical manifestations in this group were limited in variety but were common to so many disorders in infancy that a sharply defined clinical picture could not be drawn. Usually, these infants had symptoms referable either to the gastrointestinal tract or to the respiratory system. Vomiting and diarrhea with failure to gain weight or loss of weight preceded the onset of signs of infection of the respiratory system in some cases, but in others a severe and nonproductive cough was an early complaint followed later by a productive cough and physical signs of partial or complete obstruction of different parts of the bronchial tree. Vomiting was usually not present. Diarrhea was occasionally severe and often lasted for prolonged periods. The stools contained no pus or blood and were definitely not fatty. The average duration of the illness of the patients who lived beyond the neonatal period was six months. The average age at death in this group was 8 months.

Group 3.—About half the patients in Andersen's series fell into this group and ranged in age from 6 months to 14½ years. They all died of pulmonary infection. Only one fifth of the patients described by Blackfan and May were included in this group, which possessed clinical features similar to those of true celiac disease, such as emaciation, distention of the abdomen and large, pale, putrefactive, fatty stools. All these patients died of pulmonary disease.

GENGENBACH, Denver.

A TOXIC FACTOR IN TISSUES IN CASES OF NONSPECIFIC ULCERATIVE COLITIS. PAUL E. STEINER, D. WARREN STANGER and MIRIAM BOLYARD, Proc. Soc. Exper. Biol. & Med. **55**:8 (Jan.) 1944.

The nonsaponifiable fractions of lungs and livers of various patients, obtained at autopsy, were injected into mice. A toxic factor was present in certain instances, as evidenced by shock, collapse and coma with twitchings and convulsions, usually terminating fatally. Three out of 4 extracts from livers in cases of nonspecific ulcerative colitis were highly toxic, producing shock in every mouse and death in nearly all. Of the 23 extracts from livers of control patients, 16 were nontoxic and 6 were mildly so and 1 (from a cirrhotic liver) killed 3 of 15 mice inoculated (but other extracts from cirrhotic livers were nontoxic). Of the lungs of 3 patients with nonspecific ulcerative colitis, 2 were nontoxic but the third was extremely potent. Fifty-nine control lung extracts were injected into 451 mice with no deaths. The toxic factor was present in extracts from pooled lungs of stillborn infants but not in pooled extracts from the livers of these infants. Attempts were made by the authors to identify the toxic factor, which, it is suggested, is an amine.

HANSEN, Galveston, Texas.

ACUTE GASTRO-ENTERITIS IN CHILDREN: A REVIEW OF 411 CASES, 1936-43, AND A PLAN OF INVESTIGATION AND TREATMENT. WILLIAM GUNN, Brit. J. Child. Dis. **41**:1 (Jan.-March) 1944.

The number of recorded deaths in England and Wales from enteritis and diarrheal diseases in children under

2 years of age exceeds the number of deaths at all ages from each of the other chief killing infectious diseases of childhood. A number of causes are doubtless responsible, but the two chief factors are (*a*) decline in breast feeding and (*b*) delegation of duties of nursing while the mothers are engaged in war work.

Some of the salient features are:

1. The disease is readily transmissible, and an attack initially mild may prove fatal.
2. Breast-fed babies are not immune, but attacks among them are mild and rarely fatal.
3. The disease is clinically distinct from infections by known intestinal pathogens, for example, dysentery and Salmonella organisms, which are rarely fatal.
4. Recognizable infection of the upper respiratory tract is often present, but no special organism is associated, a fact which has led many physicians to postulate a virus as responsible.
5. Mastoiditis is the most frequent and striking morbid change found at autopsy.
6. Initial toxemia and dehydration can usually be corrected, but subsequent progress depends on the presence of an infective focus and the degree of success achieved in dealing with it.

The author advocates a thorough blood and biochemical examination and a bacteriologic investigation of each case.

The two aims in treatment should be (1) to restore metabolism to normal as early as possible; (2) to eliminate or neutralize infection or toxemia.

No specific drugs are available as yet. Sulfaguanidine was not found helpful. Sulfasuxidine proved effective in checking excessive fermentation and permitted early administration of dextrose by mouth.

Isolation in single rooms with strict observance of aseptic nursing precautions is considered most important.

LANGMANN, New York.

Nervous Diseases

MENINGITIS ON THE ISTHMUS OF PANAMA. B. H. KEAN and W. D. CRANDALL, Am. J. Trop. Med. **24**:17 (Jan.) 1944.

The authors found 1.14 patients with bacterial meningitis among 1,000 admitted to Gorgas Hospital. Tubercle bacilli were responsible in 29.9 per cent of the cases, pneumococci in 22.9 per cent, meningococci in 22.7 per cent, streptococci in 7.2 per cent, staphylococci in 2.9 per cent, influenza bacilli in 2.7 per cent and mixed organisms in 11.7 per cent. The death rate for all patients was 86.8 per cent. All patients with meningitis caused by tubercle bacilli, pneumococci or staphylococci died. Five per cent of the patients with streptococcic meningitis and 15 per cent of those with influenza meningitis recovered. Fifty per cent of the patients with meningococcic meningitis died.

BURPEE, Augusta, Ga.

CHEMOTHERAPY OF INTRACRANIAL INFECTIONS: II. CLINICAL AND PATHOLOGIC EFFECTS OF INTRACRANIAL INTRODUCTION OF SULFANILAMIDE, SULFATHIAZOLE AND SULFADIAZINE IN NORMAL DOGS. WILLIAM F. MEACHAM, RALPH ANGELUCCI, EDMUND BENZ AND COBB PILCHER, Arch. Neurol. & Psychiat. **50**:633 (Dec.) 1943.

The authors tested the effect of applying sulfanilamide, sulfathiazole and sulfadiazine to the cortex of dogs. Applications of sulfathiazole produced convulsions with acute pachymeningitis and leptomeningitis and corresponding subacute or chronic inflammation in the later stages, severe fibroplasia in the dura, gliosis and varying degrees of neuronal degeneration in the cor proliferation of oligodendrogliocytes and metamorph of microglia cells. They suggest that sulfathia should not be used in a cranial wound.

BEVERLY, Chicag

AGENESIS OF THE CORPUS CALLOSUM WITH POSS PORENCEPHALY. ALEXANDER T. BUNTS and J S. CHAFEE, Arch. Neurol. & Psychiat. **51**:35 (J 1944.

The literature on agenesis of the corpus callosum reviewed, and a case in which this anomaly was d nosed during life by encephalographic means is repor The patient was a 48 year old man who showed prog sive deterioration of the central nervous system.

BEVERLY, Chicag

EXPERIMENTAL INVESTIGATIONS AS A BASIS TREATMENT OF TYPE B HEMOPHILUS INFLUEN MENINGITIS IN INFANTS AND CHILDREN. HATTI ALEXANDER AND GRACE LEIDY, J. Pediat. **23**: (Dec.) 1943.

The experimental results reported in this paper the published experience on the results of treatment influenzal meningitis have established the fact tha combination of sulfadiazine with type-specific antib is the treatment of choice for infants and childr Nonetheless, publications asserting the sufficiency the various sulfonamide drugs when used alone c tinue to appear. These reports fail both to pres sufficient data and to include enough cases to warra conclusions. However, the fact that chemotherapy al does succeed from time to time indicates a need examine the matter more closely and to determine possible, the circumstances in which the sulfonam compounds can be relied on and those in which combined treatment must be used.

It is clear from the results that all the sulfonam compounds exert a significant inhibitory effect aga Haemophilus influenzae, both in the test tube and infected mice. A fairly extensive experience w mouse protection tests for comparison of sulfanilam sulfapyridine and sulfadiazine leaves no doubt that last is the drug of choice among these three.

In vitro tests likewise show that sulfadiazine is vas superior to sulfanilamide and definitely superior sulfapyridine, as judged by minimal effective conc trations. Sulfathiazole and sulfamerazine possess inhibitory capacity approximately equal to that sulfadiazine.

Sulfadiazine is limited in its power to protect m when the inoculum exceeds a certain maximum, matter how high the concentration in the blood is rais This maximum appears to be 10,000 minimal le doses. Serum alone likewise usually fails to pro when the inoculum exceeds this range. When th two agents are combined the mice regularly withst 1,000,000 minimal lethal doses.

This synergistic effect of the two agents appears be essential in the treatment of severe meningitis d to type b Haemophilus influenzae in infants and childr When the infection is judged mild, as indicated by concentration of dextrose in the spinal fluid of 40 m or more per hundred cubic centimeters, and when t clinical features are in keeping with this, the use sulfadiazine alone is justified initially. The autho experience suggests that the simple in vitro te described may be of value in determining the suscep bility of a given strain to sulfadiazine. If these te indicate satisfactory inhibition, as judged by the mini effective concentrations, it is believed that use of the d

ne may be continued without risk, provided that ical improvement ensues and provided that examina- of the spinal fluid shows the infection to be under trol, with cultures sterile forty-eight hours after the rt of chemotherapy.

Two points deserve emphasis. A longer period of rapy with the sulfonamide compound appears to be essary, if recovery is to be complete, when sulfa- zine alone is used than when rabbit antibody is used addition. When both agents have been used it has n the policy of the authors to discontinue the ministration of sulfadiazine one week after steriliza- n of the spinal fluid, provided the chemical and cellu- constituents of the fluid are in the normal range, culture remains sterile and the clinical improve- nt parallels the laboratory results. If sulfadiazine used alone, this period should probably be extended two weeks. The initial improvement seen so fre- ently following the use of sulfonamide compounds can misleading. The patient may seem to be better, dged either clinically or by changes in the spinal fluid. e number of cells shows a striking decrease, content sugar rises and the organisms are not seen in stained ears; but the use of satisfactory culture mediums lds growth of the organisms and thus demonstrates t the infection remains active. We have seen many amples of such a course.

The criteria suggested for selection of patients itable for treatment with sulfadiazine alone are as llows:

1. The treatment must be started early in the course a mild infection.
2. The strain of type b H. influenzae causing the fection must be shown to be sensitive to sulfadiazine.
3. The spinal fluid should be sterile forty-eight hours ter administration of sulfadiazine, and frequent exami- tions of the spinal fluid must demonstrate that it mains sterile, and that the sugar content of the spinal id is maintained above 40 mg. per hundred cubic ntimeters. If sulfadiazine alone fails to accomplish ese ends, type b H. influenzae rabbit antiserum should administered.

ALEXANDER, New York.

THE ETIOLOGY OF CONGENITAL CEREBRAL PALSY. HERMAN YANNET, J. Pediat. **24**:38 (Jan.) 1944.

A statistical analysis of data for various pertinent ctors obtained from the histories and examinations of patients with congenital cerebral palsy was carried t. The following observations were made:

1. The average age of the mother at the time of birth the affected child is significantly greater than that und in the general population.
2. The affected children tend to have a later ordinal rth rank than would be normally expected.
3. There is a significant incidence of similarly affected blings of patients with cerebral palsy.
4. The incidence of mental deficiency in the non- fected siblings is greater than would be expected from ndom selection.
5. There is an unusually high incidence of associated hysical defects, especially those involving the eyes, in atients with cerebral palsy.

It was suggested that these and associated observations an best be reconciled with the conception that develop- ental cerebral malformations, of which a proportion ay be genetically determined, are of primary impor- nce in the causation of cerebral palsy. In support of is contention there were pointed out certain simi- rities between the results of this study and those of udies of congenital defects and malformations.

FROM THE AUTHOR'S SUMMARY.

A CONTRIBUTION TO THE PATHOLOGY AND THERAPY OF DYSARTHRIA DUE TO CERTAIN CEREBRAL LESIONS. EMIL FROESCHELS, J. Speech Disorders **8**:301 (Dec.) 1943.

The disorders of speech resulting from various lesions of the nervous system, both peripheral and central, are described. Analysis is made of the functions of the various organs of speech in paresis and paralysis. Various corrective technics are described, and illustrative cases are presented.

PALMER, Wichita, Kan.

Psychology and Psychiatry

MODERN APPROACH IN THE STUDY OF APHASIA. G. K. YACORZYNSKI, J. Speech Disorders **8**:349 (Dec.) 1943.

Four fallacies prevalent in the study of aphasia are discussed: (1) emphasis on strict cerebral localization, (2) classification of symptoms rather than study of functions, (3) inadequate observation and (4) theoretical bias.

In subjects with unilateral lobectomies, by adequate objective tests, the following phenomena were observed: 1. The threshold of perception was affected so that it took a longer time for the person to apprehend a situation. 2. The number of features which could be perceived in a situation was below normal. 3. The ability to shift from one stimulus to another was decreased. 4. The ability to perceive logical relationships between objects deteriorated.

Further progress in the reeducation of persons with aphasia must rely on a newer knowledge of the mechanisms which underlie the production of speech.

PALMER, Wichita, Kan.

THE BRUSH FOUNDATION STUDY OF CHILD GROWTH AND DEVELOPMENT: I. PSYCHOMETRIC TESTS. ELIZABETH EBERT and KATHERINE SIMMONS, Monograph of the Society for Research in Child Development, 1943, no. 8.

An analysis of psychometric data collected during a ten year study of children aged 2 to 15 years is presented. Most of the children were of North European ancestry and came from families which were superior economically and educationally. The report covers chiefly (1) cross-sectional and longitudinal analyses of scores in intelligence as determined by the Stanford-Binet test, 1916 and 1937 revisions, and the Otis S-A tests, (2) an analysis of scores in nonverbal intelligence or performance as determined by the Merrill Palmer scale, the Kent-Shakow form board, the Kohs-Kent block designs and the Minnesota paper form board, (3) an evaluation of results of psychometric tests in predicting scholastic achievement at both junior and senior high school levels, scholastic achievement having been determined by the progressive achievement test (intermediate and advanced batteries) and (4) the data for standardization of results of the Kent-Shakow form board test.

Longitudinal analysis of the results of the Stanford-Binet test revealed greater variability in boys than in girls, insignificant differences between age means for boys and for girls, and significantly large proportions of boys and of children with mothers who were college graduates among those making the largest gains in intelligence quotient. The test-retest correlations were positively correlated with the percentage of overlap of the mental ages; scores for the 1937 revision showed changes of 0 to 5 points in the intelligence quotients of 50 per cent of the group when the standard deviations

of the mean mental age at the two ages were similar. Substantial predictability was found in the results of the performance tests. The preschool Merrill Palmer test should definitely be classified among the tests of "mental manipulation of spatial relations" rather than with the Binet test. The predictability of scholastic achievement on the basis of scores on earlier intelligence tests agreed closely with the self correlations of scores on intelligence tests over equal intervals.

FROM THE AUTHORS' SUMMARY.

A SIX-MONTH REPORT ON THE PERSONALITY DEVELOPMENT OF A THIRTEEN-YEAR-OLD STUTTERING BOY. NELL WILL, Quart. J. Speech **30**:88, 1944.

The author describes a six month program of retraining for a stutterer, a boy 13 years old. Correction was approached by considering the child in his total environment; he was made to feel worthy and intelligent, given exercises for relaxation and told to think about the objects he was speaking about. He was allowed to listen to a record of a normal child hesitating over and over again, and he was told not to care if he did have hesitations. The parents, teachers and others in his environment were spoken to, and the child was encouraged to talk to these people about his stuttering. Nine of them complimented the child when he was relaxed and easy and also attempted in various ways to give him a normal situation. Apparently he adjusted in speech to the point where he was almost as fluent as a normal speaker, and his general adjustment in all directions improved. PALMER, Wichita, Kan.

Diseases of the Ductless Glands; Endocrinology

MODE OF ACTION OF THIOUREA ON THE THYROID GLAND OF RABBITS. EMIL J. BAUMANN, NANNETTE METZGER and DAVID MARINE, Endocrinology **34**:44 (Jan.) 1944.

Administration of thiourea caused hyperplasia of the thyroid gland in rabbits and a rapid decrease in both thyroxin and nonthyroxin iodine. The iodine was promptly excreted in the urine. The inhibition of the formation of thyroxin indicates that thiourea produces functional thyrostasis of the thyroid cells.

JACOBSEN, Buffalo.

QUANTITATIVE STUDY OF THE EFFECTS OF ESTRADIOL BENZOATE AND PROGESTERONE IN MODIFYING THE INCIDENCE OF BINUCLEATED CELLS IN THE RABBIT LIVER. JOHN C. ALLAN, Endocrinology **34**:50 (Jan.) 1944.

Owing to the fact that the liver normally contains a large number of binucleated cells, it was thought that the incidence of these cells might prove to be of value in assessing the activity of estrogen and progesterone, as these hormones are known to cause nuclear changes in the cells of the uterus and vagina.

It was found that with physiologic concentrations there was a direct relationship between the amount of estradiol benzoate and progesterone administered and the incidence of binucleated cells.

Whether the liver activates or excretes estradiol benzoate and progesterone, the activity is not achieved without affecting the nuclei of the hepatic cells.

JACOBSEN, Buffalo.

CRETINISM IN RATS INDUCED BY THIOURACIL. A. M. HUGHES, Endocrinology **34**:69 (Jan.) 1944.

Continued administration of thiouracil to rats from the time of birth resulted in seriously retarded growth, arrested development, mild anemia and changes sim to those seen in cretinism.

If thyroxin was given concurrently these effects w not observed.

JACOBSEN, Buffal

EFFECT OF LOW POTASSIUM DIET AND DESOXYCO COSTERONE ON THE RAT HEART. DANIEL C. DAR Proc. Soc. Exper. Biol. & Med. **55**:13 (Jan.) 1

From study of 26 rats it was found that, where diet low in potassium caused little decrease in potassium in heart muscle, the simultaneous adminis tion of desoxycorticosterone caused a definite decr of the potassium in heart muscle. The sodium con was increased, while the water content remained same. The author warns that if a patient is on a low in potassium or is given considerable dextrose infusion the administration of desoxycorticoster acetate may actually lead to loss of muscle potassi

HANSEN, Galveston, Texa

Skin Diseases; Allergy

TREATMENT OF ACNE VULGARIS WITH COMEDOS MONOTERMINAL ELECTRODESICCATION. REUBEN N LAND, Arch. Dermat. & Syph. **48**:302 (Sept.) 1

Destruction of comedos and milia by monopolar el trodesiccation was carried out in 31 patients with va ous types of acne who had not responded to sim treatment. Excellent results followed in 25 patie The best results were obtained in the mild acne adolescents and in the superficial type seen mostly women in their midtwenties.

Persons with acne conglobata did not respond, patients with less severe eruptions responded well, pa ticularly when desiccation was combined with roentg treatment, a method which was used for 7 patie

JACKSON, Iowa City.

SODIUM PROPIONATE IN THE TREATMENT OF SUP FICIAL FUNGOUS INFECTIONS. EDMUND L. KEE and EDWIN N. BROYLES, Bull. Johns Hopkins Ho **73**:479 (Dec.) 1943.

Since sodium or calcium propionate incorporated bread dough inhibited the growth of molds, the auth prepared an ointment, a solution and a powder contai ing 10 per cent of sodium propionate and used th for the treatment of a variety of conditions caused common fungi. No evidence of irritation or toxic was observed, and the treatment appeared to be effecti

LYTTLE, New York.

THE EFFECT OF SODIUM, POTASSIUM AND THIOSULFA IONS ON ANAPHYLAXIS. ROBERT G. CARLSON a RICHARD W. WHITEHEAD, J. Allergy **14**:462 (Sep 1943.

Guinea pigs were sensitized to sheep serum. A sho dose was given two to four weeks after the sensitizi dose. The minimum lethal dose of serum was dete mined. The effect of sodium thiosulfate, potassi chloride and potassium thiosulfate was tested by mixi the salts with the antigen or giving them before t administration of the serum.

Sodium thiosulfate showed no inhibitory effect on t anaphylactic reaction.

The potassium salts showed some value in preventi death. There was no difference in the effects of pota sium chloride and potassium thiosulfate.

HOYER, Cincinnati.

ASMA TREATMENT OF SEVERE, NEAR-FATAL ANAPHYLACTIC SHOCK. ARTHUR H. RAYNOLDS, J. Allergy **14**:495 (Sept.) 1943.

"1. A report is presented of a case of severe, near-al anaphylactic shock of 'exudative' type (excessive od volume loss).

"2. The intravenous use of plasma, now increasingly ilable, may prove to be a specific treatment for this rming condition. It should be tried early and in equate amounts."

HOYER, Cincinnati.

HE ABSORPTION OF WHOLE RAGWEED POLLEN FROM THE GASTROINTESTINAL TRACT. R. HECHT, M. M. MOSKO, J. LUBIN, M. B. SULZBERGER and R. L. BAER, J. Allergy **15**:9 (Jan.) 1944.

"1. The absorption of pollen allergen from the gastro-estinal tract was studied by means of the reactions oduced in passively sensitized skin sites.

"2. The appearance of the reaction varied, some ving reaction and some not. The results suggest that ere is a relationship between the acidity present in e stomach at the time of ingestion of the pollen, and e absorption of the pollen allergen.

"3. Artificial elevation or reduction of gastric acidity oral administration of acids or alkalies tends to crease or respectively increase the absorption of orally ministered pollen allergen."

AUTHORS' SUMMARY.

HE EXPERIMENTAL USE OF ETHYLENE DISULFONATE (ALLERGOSIL BRAND) IN THE PREVENTION OF ANAPHYLAXIS IN GUINEA PIGS. ROY T. FISK, WILLARD S. SMALL and ALVIN G. FOORD, J. Allergy **15**:14 (Jan.) 1944.

Ethylene disulfonate is one of many substances sug-ested for the treatment of bronchial asthma. Several vestigators have reported it to be effective in the evention of anaphylaxis.

Because of a great difference in the death rate of ntrol animals in experiments reported previously by her investigators, the authors performed the present udy. They concluded that ethylene disulfonate does ot produce a significant degree of protection against naphylactic shock.

HOYER, Cincinnati.

AILURE OF VITAMIN E IN THE TREATMENT OF RAGWEED POLLINOSIS (HAY FEVER). JEROME GLASER and HENRIK DAM, J. Allergy **15**:18 (Jan.) 1944.

Ephynal acetate, synthetic vitamin E, was given to 9 patients with hay fever during the season of exposure 1942. The results were compared with those obtained y the administration of pollen extracts and symptomatic emedies to the same persons the previous year and to group of controls the same year.

The authors feel that synthetic vitamin E has no alue in the treatment of pollinosis due to ragweed.

HOYER, Cincinnati.

OTENTIAL POLLINOSIS IN A DESERT AND A COASTAL CITY: A COMPARATIVE BOTANIC SURVEY OF BARSTOW AND SANTA ANA, CALIFORNIA. R. W. LAMSON, H. MCMICHAEL and M. STICKLER, J. Allergy **15**:21 (Jan.) 1944.

The authors present a comprehensive article pertaining o the vegetation in and around Barstow and Santa Ana. The survey extended over a period of eight years nd shows that the flora may vary from year to year. Studies were made during different seasons.

HOYER, Cincinnati.

TREATMENT OF SCABIES WITH AN EMULSION OF ROTENONE. E. P. WOODROW, South African M. J. **17**:233 (Aug. 14) 1943.

The author reports excellent results in the treatment of 225 patients with scabies with an emulsion of rotenone. Of the 177 patients who returned for observation, all except 10 were cured by one course of treatment. Of the 10 who relapsed, 9 were cured after one further course of treatment, and the tenth required a third course. The solution used on all infants under 9 months of age and on many adults with mild infestations consisted of 1 per cent rotenone and 3 per cent chloroform in mucilage of chondrus. For severe infestations in adults the percentages of rotenone and chloroform were doubled. The lotion was applied twice the first day and twice the second, a bath being taken before the initial application but not again until the third day.

GONCE, Madison, Wis.

Surgery and Orthopedics

TEMPERATURE IN SHOCK. J. DEVINE, M. J. Australia **2**:476 (Dec. 11) 1943.

After trauma to the hindlegs of dogs the increase in volume of the warmed limb was over three times that of the cooled limb. The logical clinical application of this observation is that, firstly, heat should not be applied in the neighborhood of injuries that are likely to cause shock, for if this is done local loss of circulating fluid to the tissues will be increased, and, secondly, cooling of a traumatized limb may be effective in lessening the local loss of fluid from the circulation and may thus be helpful in modifying the onset of shock.

GONCE, Madison, Wis.

BURNS IN CHILDREN. H. E. GIGLIO, Rev. Soc. pédiat. de la Plata **4**:87 (Dec.) 1943.

The first steps in the treatment of burns in children are to cover the wound with sterile compresses and to quiet the pain of the child until he can be brought to a place where treatment can be given. The use of morphine in children under 5 years of age is contraindicated. The giving of blood and plasma transfusions is essential when burns are severe. Good results have been obtained with the use of a tannic acid salve.

HIGGINS, Boston.

Miscellaneous

THE USE OF THE SUPPOSITORY AS A VEHICLE IN SULFONAMIDE THERAPY. JAMES H. PARK JR., J. Pediat. **23**:326 (Sept.) 1943.

To avoid the gastric irritability due to oral administration of sulfonamide drugs, which interferes with the absorption of the drug and with the maintenance of the desired intake of fluids and food, the author suggests that the drug be prescribed in the form of a rectal suppository. The base employed in making the suppository is oil of Theobroma, which melts quickly in the rectum, leaving the drug available for reasonably rapid absorption. Any desired dose may be utilized; however, suppositories containing 7.7 grains and 15.4 grains of the preferred sulfonamide drug have been satisfactory in most instantes. The rectal dose is twice that given by mouth.

Thirty minutes before treatment is instituted a cleansing enema of warm water should be given. The parent or nurse is instructed to then insert one suppository into the rectum, for retention, and to repeat this at

stated intervals. The buttocks should be held firmly together for fifteen to twenty minutes or strapped with adhesive plaster if necessary to prevent expulsion of the medicament. Estimations of the level of the sulfonamide drug in the blood have demonstrated that this method of treatment is as efficacious as that by mouth.

FROM THE AUTHOR'S SUMMARY.

PROBLEMS IN SAFEGUARDING ADOPTIONS. HUGH K. BERKLEY, J. Pediat. **23**:344 (Sept.) 1943.

The first step in an adoption is the selection of a home where the potentialities of the child will be recognized and where he is likely to find emotional satisfaction. When an unrelated child is placed in a permanent home, professional skill is necessary to make sure that the persons selected as the future parents are those with whom the child is most likely to be happy and emotionally well adjusted. The safest procedure is to act through an agency with authority to accept guardianship. Acting through such an agency also assures the foster parents that the child taken into their home will not be removed unnecessarily. A frequently overlooked advantage of placement by an agency is the fact that the child has the benefit of a continuing interest in his welfare.

Because an adoption is a life plan, not just for babyhood, it is important to delay placement plans until the child is old enough so that his particular needs can be determined and the selection of a home and parents for him be made with these needs in mind. The Children's Bureau of the United States Department of Labor considers four months as the earliest advisable age for adoption.

The age of the child in relation to the ages of the foster parents must be carefully considered. They should have a life expectancy such as to assure that the child may reach maturity during their life time. They should be young enough to share the child's interests. It is also important that they shall not have adopted the child in anticipation of his supporting them as soon as he reaches maturity.

Satisfactory laws are not of themselves sufficient safeguards for adoptions unless supported by intelligent administration. Even without uniform laws considerable uniformity has been achieved by the acceptance of certain desirable safeguards. These include:

1. *A social study or investigation of every petition to adopt a child.* This is important, for the desire of a family for a child is not in itself sufficient evidence that it should be permitted to adopt a particular child, or perhaps even any child. Further, the mere availability of a child for adoption is not proof that the child is adoptable material.

2. *A report to the court after the social study.* A sound study loses much of its value unless the information obtained is presented to the court in such form that it will provide a basis for the final decision, which, of course, rests with the judge hearing the petition for adoption.

3. *A required period of residence for the child in the home before adoption becomes final.* A "period of absorption" allows the child and the foster parents to become adjusted to each other. Supervision and assistance to the prospective adoptive parents have great value in protecting the welfare of the child. An interlocutory period of one year with a supplementary report at the close of that period is recommended.

4. *A carefully drawn provision for consent that respects the rights of the natural parent.* Consent from a legally qualified authority should be required in every adoption, parental rights having been terminated either by court action or by voluntary relinquishment. A second court action should be required to determine the merits of the proposed adoption so far as the welfare of the child is concerned.

5. *A plan for the protection of all official records of adoption from persons who have no legitimate reason to be permitted access to them.* It is advised that access to records of adoption be limited to "parties to the action." It is further advised that prior to "final action" parental rights be transferred to an agency. This obviates the possibility of the child's own parents or parents becoming "parties to the record" with the right to see the record of adoption.

6. *Restriction of jurisdiction in adoption to residents of the state and, except in exceptional circumstances, to residents of the county where the adoption is filed.* The lack of protection for records of adoption has probably influenced some prospective adoptive parents to file petitions for adoption in jurisdictions other than the one in which they reside. Such interstate traffic cannot fail to produce undesirable situations or abuses.

7. *A plan for a report of every adoption to the division of vital statistics in which proof of birth is included together with the date of the adoption and sufficient information about the foster parents to make possible the filing of a certificate of adoption in the new name of the child and in the names of the foster parents.* A provision requiring the filing of official reports of every adoption would make possible an accurate statistical count of the number of adoptions in each state as well as some additional information about the children adopted and the persons adopting them. A certificate of birth indicating the child's legal name, the date and place of his birth, the registration number of the original certificate of birth and the date it was filed is recommended. This presents proof of birth and citizenship, does not indicate either adoption or birth out of wedlock, and spares the child any possible future embarrassment because of the circumstances of his birth.

Legislative safeguards in adoptions are important but must be strengthened by administrative practices so that the intent of the laws may be actually realized. Many good laws never serve their purpose because of the lack of provisions for their administration.

SHMIGELSKY, Chicago.

PULMONARY MANIFESTATIONS FOLLOWING INGESTION OF KEROSENE. LEONARD I. LESSER, H. STEPHEN WEENS and JOHN D. MCKEY, J. Pediat. **23**:[illegible] (Sept.) 1943.

Accidental ingestion of kerosene by young children is not uncommon. During a two year period 33 patients from 1 to 3 years of age were studied at Grady Hospital. Most of the patients had fever, the temperature ranging from 99 to 104.5 F. Vomiting and coughing were frequently observed. Ten patients were drowsy and 4 patients were comatose on admission to the hospital. Though clinical signs of pneumonia were present in only 8 of the 33 patients, pulmonary changes were demonstrated roentgenologically in 77 per cent of the patients examined. Pulmonary edema, hemorrhage and superimposed inflammation were observed in cases at autopsy and in animal experiments. Roentgenologically these pulmonary changes appear as mottled, confluent or nonconfluent densities in the lungs, and they may be demonstrated within a few hours after the ingestion of kerosene and may disappear after an interval of several days. In animal experiments it was demonstrated that the pulmonary changes are brought about by aspiration

kerosene into the respiratory tract and are not the lt of absorption from the gastrointestinal tract with sequent excretion into the lungs.

SHMIGELSKY, Chicago.

LUENCE OF VARIOUS DRUGS ON THE THRESHOLD FOR ELECTRICAL CONVULSIONS. M. L. TAINTER and others, J. Pharmacol. & Exper. Therap. **79**:42 (Sept.) 1943.

Using a special electric device the authors determined convulsive threshold of unanesthetized rabbits. As group the depressant drugs raised the convulsive eshold while the excitant drugs (strychnine, niketh-ide and others) were irregular in action; only picro-in, even in small doses, lowered the threshold to a siderable degree. Thyroxin lowered the threshold epileptiform convulsions more than any of the other nts tested, the threshold being reduced from an rage of 23.1 milliamperes in the control period to 7 milliamperes after nineteen days of thyroxin medi-ion. This reduction suggests a possible physiologic is for the impaired neuromuscular control and the r poise of clinical hyperthyroidism. Many other gs were tested also, with which the results were less iking.

PILCHER, Cleveland.

OOD LEVELS OF SULFADIAZINE, SULFAMERAZINE AND SULFAMETHAZINE IN RELATION TO BINDING IN THE PLASMA. D. ROURKE GILLIGAN, J. Pharmacol. & Exper. Therap. **79**:320 (Dec.) 1943.

Working with human blood in vitro the authors nd that sulfamerazine, sulfamethazine and their acetyl ivatives were bound in plasma to a much greater gree than is sulfadiazine. From available evidence is probable that the same relation holds true in vivo. The relative extent of binding of these drugs in the sma is discussed with respect to the interpretation of es of absorption from the rate of increase of the ncentration of the drugs in the blood and with respect its possible bearing on the relative therapeutic effec-eness of a given blood level of the different drugs.

PILCHER, Cleveland.

OLE OF INOSITOL IN ALOPECIA OF RATS FED SULFA-SUXIDINE. EDWARD NIELSEN and A. BLACK, Proc. Soc. Exper. Biol. & Med. **55**:14 (Jan.) 1944.

Inositol, 5 mg. six days weekly, succeeded in curing s of alopecia produced by the administration of lfasuxidine in addition to a synthetic diet believed to complete nutritionally. From the beginning of the e inositol was incorporated in the diet the growth s better, and the fur coat was smooth, with normal ster.

HANSEN, Galveston, Texas.

TUDIES ON GUINEA PIGS AFTER REPEATED ADMINIS-TRATION OF PARALDEHYDE. EMMETT B. CARMICHAEL, F. A. KAY and G. W. PHILLIPS, Proc. Soc. Exper. Biol. & Med. **55**:22 (Jan.) 1944.

Paraldehyde was injected intraperitoneally into adult ale guinea pigs three times a week for four weeks. he average weight dropped from 499 to 469 Gm.; the ngth of time from the injection until the onset of sleep creased from eighty-five to one hundred and twenty conds; the duration of sleep dropped from ninety-five thirty-one minutes and the length of hypnosis dropped om two hundred and thirty-one to one hundred and xty-seven. These observations indicate that guinea gs acquire a tolerance to this drug.

HANSEN, Galveston, Texas.

GALACTOSE POISONING IN CHICKS. HENRIK DAM, Proc. Soc. Exper. Biol. & Med. **55**:57 (Jan.) 1944.

Incorporation of 54.6 per cent galactose in the diet of chicks within a few days caused them to be seized with spasms, and in several days they succumbed. Cataract did not develop in these chicks, as it did in rats fed galactose, but this may be due to the fact that the chicks died within such a short time that cataract did not have time to occur. Galactose fed at a 10 per cent level to chicks did not cause symptoms. The galactose in the blood was high, but the dextrose in the blood was about normal. Muscle glycogen was also normal, but liver glycogen was almost zero. The mechanism of this disorder is not clear to the author.

HANSEN, Galveston, Texas.

EXPERIMENTS ON THE TOXICITY OF THE CALCIUM SALT OF PENICILLIN. PAUL GYÖRGY and P. C. ELMES, Proc. Soc. Exper. Biol. & Med. **55**:76 (Jan.) 1944.

Freeze-dried calcium salts of penicillin were found to be no more toxic to mice than the sodium salt of penicillin. The dose employed in some of these experiments was approximately fifty times as great in proportion to body weight as the daily dose of sodium salt used at present in human therapeutics. No toxic signs developed when the calcium salts were administered to a human subject. The authors conclude that satisfactorily purified calcium salt of penicillin is not more toxic to human beings or mice than its sodium salt.

HANSEN, Galveston, Texas.

PHEMERIDE: A NEW ANTISEPTIC DETERGENT. C. N. ILAND, Lancet **1**:49 (Jan. 8) 1944.

Phemeride (paratertiaryoctylphenyldiethoxybenzyldimethyl ammonium chloride) probably acts as an antiseptic by disrupting or interfering with the functions of the bacterial cell membrane.

The material was obtained as a white powder without odor which dissolved readily in water and alcohol. A small series of clinical tests was made. Laboratory and clinical tests suggested that phemeride is inhibitory to the common pathogens in dilutions not toxic to the tissues.

LANGMANN, New York.

BODY TEMPERATURES IN SHOCK. R. D. WRIGHT and J. DEVINE, M. J. Australia **1**:21 (Jan. 8) 1944.

In patients suffering from shock the average rectal (internal) temperature on admission to the hospital was 99.3 F. and the average oral temperature was 96.7 F. A drop in internal temperature is not usual in shock, but if the patient is subjected to low environmental temperature the internal temperature drops as readily as that of normal subjects in similar circumstances. The oral temperature is, however, frequently lower than that of normal persons. In some instances in which no heat was applied after admission to the hospital and the patient was merely covered with blankets, the rectal temperature rose well above normal limits. Practical considerations arising from these observations are the following: (1) Heat should not be applied to patients suffering from shock until the rectal temperature has been taken; (2) repeated observation of the rectal temperature of the patient after admission to the hospital will prevent deleterious overheating, and (3) heat should not be applied to a patient unless facilities are at hand to supplement the loss of circulating blood that occurs as a result of a change from peripheral vasoconstriction to vasodilatation.

GONCE, Madison, Wis.

Book Reviews

Feeding Babies and Their Families. By Helen Monsch and Marguerite K. Harper. Price, $3.50. Pp. 386, with 74 illustrations, 51 numbered and many unnumbered tables. New York: John Wiley and Sons, Inc., 1943.

From years of experience in feeding mothers and children and in teaching family nutrition the authors have compiled a volume which will prove informative and stimulating to doctors, nutritionists, home economists and dietitians and will merit their recommending it to women interested in assuring their families every nutritional advantage possible. The book is a comprehensive summary of the best scientific information available concerning foods, their preparation and feeding, and their influence on the life of mother and fetus, infant, child, adult and aged person. The text is informal, with humor and pathos intertwined to dramatize the essential role that foods have in building healthy bodies. The emphasis is placed on the practical problems of feeding rather than on academic considerations, and the presentation is unusual in its lack of dogmatism. Both sides of controversial issues are presented, and a great effort has been made to explain the "why" of each of the many phases of good nutrition.

Under chapter titles such as "Why Eat?", "The Baby is Coming" and "The Toddler Toddles" and subtitles equally light, the practical application of the most recent knowledge of nutrition is presented clearly. The material on food composition (calories, fats, proteins, minerals, vitamins, amino acids, iodine, fluorine) serves as the background for consideration of nutritional needs throughout life and how they best can be supplied. Dietaries are given for all ages, based on the daily allowances recommended by the National Research Council in 1942 and presented in terms of common foods and supplemented with quantitative weekly menus. The special advantages or disadvantages of individual foods are discussed, as well as possible substitutions and supplements to meet special conditions. A wealth of useful information not usually found in literature on feeding is presented under headings such as "Customs and Traditions," "Religious Beliefs," "Insufficient Breast Milk," "Eating Between Meals" and "Eating Outside the Home."

The authors state their hope "that the book will be valuable not only as a textbook for college students of family nutrition but also as a guide for intelligent mothers in bringing up their families." The latter objective is accomplished so well that its attainment could not avoid detracting from the book's usefulness in the classroom, though not from its value as a reading reference. The student, however, would miss detailed discussions of other environmental, physiologic and genetic factors. Also, organization of the material for a lay audience is not entirely compatible with the demands of classroom teaching; illustrations and tables are numbered separately within the chapters, and while the profusion of subject headings in the text is useful, it involves separation and repetition of some of the material. Only the authors cited and the headings are indexed; this provides adequate general reference but not complete contact with all the material within each section.

Under the title "We are Indisposed," the final chapter is devoted to discussion of some of the common ailments of childhood and later life which are frequently caused by misfeeding. Sound, practical advice on prevention is reenforced by effective logic and the histories of pertinent cases. It is regrettable that the title "treatment" is used for the sections on dietary care of the child with colic, indigestion, constipation, diarrhea, enuresis, colds, allergy and eczema. Readers might infer that this treatment constituted all necessary care and obviated the need of any medical attention. This oversight on the part of the authors will be corrected, no doubt, in future printings. One other terminologic consideration is worthy of attention: the expression "symptoms of good nutrition" is a misnomer, since in good nutrition there can be only the *absence* of symptoms of malnutrition.

Supplemental information which should prove useful to the student of family nutrition as well as to the homemaker has been assembled in an appendix. Among the tables are abbreviations and equivalents of common metric and avoirdupois measures; equivalent weights and volumes of foods, and the weights and "cup" capacities of standard sizes of tin cans. The list of daily allowances for specific nutrients recommended by the committee on foods and nutrition of the National Research Council is reproduced and its use simplified by the insertion of tables which show the nutritive values of average servings of common foods. From these tables the adequacy of the intake of food can be estimated with a minimum expenditure of time.

Medical Clinics on Bone Diseases: a Text and Atlas. By Dr. I. Snapper. Price, $10.75. Pp. 225, with 30 plates. New York: Interscience Publishers, Inc., 1943.

This book gives an excellent account of a number of nonsurgical diseases of bone that have come to be better understood as a result of researches in endocrinology, biochemistry and nutrition during the past twenty years. Generalized osteitis fibrosa cystica (von Recklinghausen's disease) is discussed in relation to hyperparathyroidism, and a chapter is devoted to hyperplasia of the parathyroids secondary to other diseases of bone. Fetal, infantile and late rickets and osteomalacia are discussed in relation to avitaminosis D. There are also clinics on osteitis deformans (Paget's disease of the bone), lipid granulomatosis of bone, Gaucher's disease, and multiple myeloma. In the discussion of each condition, a few cases are reported in great detail with extensive biochemical, roentgenographic and histologic studies, with the result that a vivid picture is presented. The book is particularly helpful from the standpoint of diagnosis, but it also throws considerable light on the treatment of those diseases of bone which are related to the parathyroid and to nutrition.

Jornada pediatrica de la Habana. Edited by M. V. Fresneda. Price, $5.00. Pp. 538, with 122 illustrations. Habana, Cuba: Sociedad Cubana de Pediatria, 1942.

The transactions of the Cuban Pediatric Society for the meetings of Dec. 12 to 15, 1940 open with a twenty-three page résumé by Professor Inclan of the history of pediatrics in Cuba. This is followed by thirty-five articles on various pediatric subjects by the members

of the society. The articles are well printed and profusely illustrated with charts, tables and roentgenographic prints.

As the Child Grows. By Helen Brenton Pryor, M.D. Price, $3. Pp. 400, with 16 diagrams and 8 charts. Chicago: Silver Burdett & Company, 1943.

The preface, written by Professor Hanna of Stanford University, states the case perfectly when it says that the purpose of this book is to help teachers, parents and all others who guide youth to gain a clearer insight into the needs of children by understanding better the distinctive characteristics of boys and girls in the various stages of their growth and maturation. It attempts to picture the child as a whole."

To marshal all of the facts and opinions necessary to accomplish this appalling task requires a courageous person; Dr. Helen Pryor has made the attempt, in general with good results. I believe that the preface is substantially correct when it states that "this volume will find a wide reception among teachers and parents because it develops the scientific bases of these differences in a language and style that the layman to medicine and physiology can understand, and because it gives many practical suggestions to parents and teachers for handling the problems peculiar to the child at each stage of its development."

However, the "layman to medicine and physiology" will have to concentrate, and sharply, for the mass of factual material is tremendous. I question whether many teachers of children, much less parents, have the scientific background and surplus intellectual energy to digest such material as is presented on embryology and genetics. Medical students in the preclinical years would no doubt be deeply grateful for such condensation and popularization of weighty material.

The pediatrician will be grateful to find between the covers of one book so many of the opinions held by social workers, psychologists, geneticists and persons of almost every other type concerned with children, whether he agrees with them or not. He probably will object to the classification of all human beings, even roughly, into "broad-built lateral types" and "slender-built linear types," for metamorphosis is certainly observed at various levels of growth. He will wonder if it is really established that "at the critical moment during the second month of gestation the mother may run a high fever and halt the growth of the thyroid gland, causing so-called Mongolian idiocy. This is the sort of thing that should be more widely known" (if true). He will reject as unproved the statement, in the discussion of poliomyelitis, that "large doses of convalescent serum are helpful in reducing the severity of the attack." The inclusion of this and other definite statements of opinions on medical issues which are still most controversial and of opinions quite contrary to leading pediatric opinion, leads one to hope that the same license is not being taken in fields with which the pediatrician is less familiar.

There is a comprehensive, well chosen bibliography which is attractively and accessibly arranged. The appendix contains material on such diverse subjects as adolescent development in girls, assessment of growth, determining of body build, studies of basal metabolism and of diseases and overweight and underweight children.

From what has been said previously it becomes apparent that almost everything that concerns life before maturity is discussed, and in a readable manner. Considering the material, I expect to use the book for quick, easy reference on certain constants in pediatrics, for its bibliography on fields related to pediatrics and for its summary exposition of these related fields.

The Arthropathies: A Handbook of Roentgen Diagnosis. By Alfred A. de Lorimier. Price, $5.50. Pp. 319, with 678 illustrations. Chicago: The Yearbook Publishers, Inc., 1943.

It is a joy to read and use this handbook by Colonel de Lorimier, Commandant of the Army School of Roentgenology, Memphis, Tenn. Every pediatrician, internist, surgeon and roentgenologist should welcome it as a valuable vade mecum. The author's introduction states that an evaluation of the roentgen evidence concerned with conditions in and about joints is dependent on four points, a knowledge of embryology, a knowledge of detailed anatomic relations, an understanding of pathologic changes and familiarity with the clinical aspects of the particular case, including laboratory data. A description of normal joints and points of roentgenologic interest and importance based on their anatomy introduces the discussion. The arthropathies are then described, using a classification based on the etiology so far as known.

Part I deals with the peripheral joints explaining by clearly marked illustrations the developmental malformations and pathologic changes. The osteochondropathies, specific and nonspecific, of juvenile and adult types, are discussed next, followed in order by the arthropathies in which the changes are essentially concerned with mechanical stresses, those related to protein reactions, toxins or bacterial invasion, the true arthritides and lastly gout, neoplasms and various miscellaneous disorders such as calcification of the medial collateral ligament of the knee due to trauma (Stieda-Pellegrini disease), ainhum and scleroderma.

Part II deals with the joints of the spine including developmental formations, osteochondropathies, osteoarthropathies, neuroarthropathies, toxic arthropathies, infections, arthritis, neoplasms and miscellaneous disorders from fragilitas ossium (osteogenesis imperfecta) and hyperparathyroidism to regional tumors and aneurysms.

The small compact format of the book lends to its attractiveness. The reader may find a magnifying glass of great assistance in reading the film reproductions. The only possible criticism of the whole volume may be that the legends for the illustrations are printed in type which is too small.

Kinderzeichnungen in vergleichend phychologischer Beleuchtung: Untersuchungen an serbischen Kindern. By Franziska Baumgarten, Ph.D., and M. Tramer, M.D. Price, 3.50 Swiss francs. Pp. 210, with 57 figures. Basel, Switzerland: Benno Schwabe & Co., 1943.

The authors report the results of psychologic studies of 272 Serbian children 5 to 12 years old who were sent to camps in Switzerland for recreation. Because of difficulties in language, the psychologic tests were based on three types of drawings. The children were asked to draw (1) the picture of a person, (2) a subject left to the imagination of the child and (3) a subject referring to their homeland.

It is instructive to a pediatrician to see how many interesting conclusions can be reached by using children's drawings for psychologic tests. The boys up to the age of 9 years always drew pictures of boys, never of girls; with increasing age the percentage of girls in the pictures increased and at the age of 12 years only

70 per cent drew pictures of boys. Similar observations were made on Swiss children. The authors offer as an explanation that younger children prefer playmates of the same sex but that this desire diminishes with approaching puberty. The majority of the children selected as the subject of free choice a house or something referring to the home. The drawings of the boys were exact and positive and demonstrated a sense of objectivity, while the drawings of the girls were guided mostly by sentimentality. The book includes many other interesting conclusions and discussions.

The fifty-seven figures given as examples of the children's drawings are admirably reproduced, printed on an excellent type of paper.

White Blood Cell Differential Tables. By Theodore R. Waugh, Pathologist in Chief, Royal Victoria Hospital; Associate Professor of Pathology, McGill University, Montreal, Canada. Price not given. Pp. 15, with 10 tables. New York: D. Appleton-Century Company, 1943.

There has been an increasing conviction in recent years among clinicians and laboratory workers that the finer diagnostic value of the differential leukocyte count resides in the absolute rather than the relative number of each type of cell present. Consequently many laboratories now report the differential count in terms of the actual number of polymorphonuclear leukocytes, lymphocytes, monocytes and eosinophils, instead of in the traditional percentage figures. This information is of particular significance in cases of illness in infants and children and in cases of leukopenia and leukocytosis. Ordinarily the absolute value for each type of cell may be obtained from the conventional differential count by calculation of the given percentage of the total count. This procedure is time consuming when large numbers of counts are done, and to obviate this the author has prepared a set of convenient tables. Besides providing the reader with tables for rapidly computing the actual number per cubic millimeter of each type of white cell from the known differential percentage, the author has included some concise introductory notes on white blood cells and differential counting for the novice. The use of the tables is clearly set forth and specific examples are given. These convenient tables should be welcomed by clinicians specifically interested in interpreting hemograms. Their value and convenience are self evident to pathologist, hematologist and laboratory technician.

Physique, Personality and Scholarship: A Cooperative Study of School Children. Monograph of the Society for Research in Child Development, vol. 8, ser. 34, no. 1. By R. Nevitt Sanford, Margaret M. Adkins, R. Bretney Miller, Elizabeth A. Cobb, and others. Price, $2. Pp. 705. Washington, D. C.: National Research Council, 1943.

This study, for the major part of which the senior author is responsible, covers the developmental history of the school child and includes detailed data on 48 children aged 5 to 14 years. The approach is an intensive one, using biologic, psychologic and other technics to study children not as discrete organisms but as living, changing, functioning human beings at one of the most important stages of their development.

The investigators have taken the point of view that no single factor is, by itself, of sufficient significance to merit full consideration unless other related aspects of development are included in the evaluation. This monograph, therefore, is concerned not only with the several physical, psychologic, physiologic and sociologic variables but, more closely, with their many interrelationships and the effects on personality, adjustment and school success thus produced. The circumstantial histories of cases and the precise descriptions of traits add interest and individuality to the volume.

Safe Convoy: The Expectant Mother's Handbook. By William J. Carrington, M.D. Price, $2.50. Pp. 256, with no illustrations. Philadelphia: J. B. Lippincott, 1944.

This book is an addition to the handbooks for expectant mothers, of which there already are a number. It differs somewhat from most of those which have already been published in that it contains also a considerable amount of information concerning the care of babies. The book is written in an attractive style, and historical allusions are interpolated here and there, which add to the interest of the story which is being told.

Reproductive anatomy is explained briefly and well. A considerable amount of attention is given to diet; the vitamins are dealt with simply and adequately. The dietary section is to be commended, although the reviewer had supposed that Prochownik's diet for the production of a small child had been relegated to the limbo of forgotten things. The chapters on diagnosis and on labor are well done and will be understood easily by the average mother-to-be.

The latter part of the book reaches over into the domain of pediatrics, with a section on the care of infants, including some pages dealing with common disorders of infants.

A feature which seems new is the short chapter devoted to that usually neglected person the father of the infant, entitled "Fathercraft."

The book may be commended as a simple and accurate guide for expectant mothers.

Pathology and Therapy of Rheumatic Fever. By Leopold Lichtwitz, M.D., lately Chief of the Medical Division of the Montefiore Hospital, and Clinical Professor of Medicine, Columbia University. Foreword by William J. Maloney, M.D. Edited by William Chester, M.D. Price, $4.75. Pp. 225, with 69 illustrations. New York: Grune & Stratton, Inc., 1943.

This book arrives on the scene when rheumatic fever has become a public health problem of growing importance in both civil and military life. Dr. Lichtwitz dwells particularly on the pathology and therapy of the disease. He has made an exhaustive study of the literature, and the bibliography at the end of each chapter is extensive.

The author argues that rheumatic fever is a manifestation of allergy, and his thesis is summed up in the following quotation: "The pathologic basis of this disease is the allergic sensitization of certain mesenchymatous tissues." He contends that the disease is one of defense, not of invasion, and that it has its counterpart in serum sickness. Lack of defense is termed anergy and its excess hypergy. The mechanism of hypergy is dependent on the allergic sensitization of the person which, in turn, is influenced by antigens of bacterial origin. The author recognizes the hemolytic streptococci as probable inciting bacterial agents and builds up from this his theory of allergic response.

There is much in the book which holds little interest for the pediatrician, but, on the other hand, there is much of value, particularly to those who are interested in the clinical manifestations, pathology and therapy of rheumatic fever and rheumatic heart disease. Lastly

e foreword is well done and is recommended for reful reading.

rthopedic Nursing. By R. N. Funsten and Carmelita Calderwood. Price, $3.75. Pp. 559, with 181 illustrations. St. Louis: C. V. Mosby Company, 1943.

The great importance of competent, experienced nursg for orthopedic patients is appreciated by all who e responsible for the end results. This is particularly pparent now, when the turnover in the nursing perinnel is apt to be higher than ever before.

This book will be a great help in the teaching of the rinciples of orthopedic nursing.

Attention to detail makes the difference between good nd bad technic, and this is especially true in the care f orthopedic patients. It is impossible to give in detail he various technics used throughout the country, but he basic procedures are described. Each orthopedist ill want certain changes made to suit his own methods f handling the different types of orthopedic conditions.

Office Treatment of the Nose, Throat and Ear. By A. R. Hollender. Price, $5. Pp. 480, with 33 illustrations. Chicago: The Year Book Publishers, Inc., 1943.

This book fills a much needed place in the field of otorhinolaryngology. To the intern or hospital resident alled on to treat transient ambulatory patients in the bsence of the attending surgeon and to the man on whose shoulders the practice of the specialty has been orced by the fortunes or misfortunes of war the book s invaluable. It is well illustrated, clearly written and oncise. In each chapter the author has discussed the arious methods in vogue at the present time in the reatment of specific disorders, and at the end of the hapter he has summarized the discussion and evaluated he methods from his own experience.

The work is complete and thoroughly modern.

Pioneers of Pediatrics (Historia medicinae, Volume 9). Edited by Dr. Abraham Levinson. Second edition. Price, $2. Pp. 119, with 29 illustrations. New York: Froben Press, Inc., 1943.

This is the second edition of a book which contains short reviews of the works of various pediatricians down the ages. It is instructive, especially in the first few chapters, which deal with other than contemporaries. Not every one will agree with the choice of men or the distribution of emphasis, since this, of course, is a matter of the personal equation. On the whole, the book is one which claims interest and deserves commendation.

Doctor Colwell's Daily Log for Physicians, 1944. Price, $6. Champaign, Ill.: Colwell Publishing Company, 1943.

This book for 1944 is a replica of those for previous years but also contains a new form for nonprofessional deductions and a tax table or schedule furnished by the Treasury Department. These additions should prove useful.

Baby Doctor. By Isaac A. Abt. Price, $2.50. Pp. 310, with no illustrations. New York: McGraw-Hill Book Company, Inc., 1944.

When Dr. Abt finished his premedical work at Johns Hopkins University, he appealed to Professor Welch for advice as to the best medical school to go to. The Johns Hopkins Medical School was not started until five years later. Dr. Welch assured him that no medical school of that day was "too good" and added: "It won't make any difference where you go. Everything depends on you." That he spoke wisely then, as always, is demonstrated in this little book.

As compared with modern standards of medical education, the medical schools of that day were "none too good." Most of them still had only an ungraded course of two terms of six months each, but the old Chicago Medical College, a department of Northwestern University, offered a graded course of three terms of nine months each, the first medical school to do so in this country, and it was in Dr. Abt's home town. So he entered that school and graduated with the famous class of 1891. That things weren't any too good even in the Chicago Medical College is shown, for example, in two statements: "There were only three full time paid employees, a janitor, a registrar and the professor of chemistry"; and the dean of the school "did not believe in bacteriology, asserting that it was only a passing fad," although it was seven years since Koch had published his epochal work on the tubercle bacillus. After eighteen months of internship at the old Michael Reese Hospital and another eighteen months in Vienna, Berlin and London, the young doctor hung out his shingle in Chicago and soon demonstrated that Professor Welch's second statement was well founded.

There were only a few men in the whole country at this time who restricted their work to pediatrics; nearly all of the men who were especially interested in work with children did some "bread and butter" general practice. Dr. Abt followed the same course, and, having had some training in obstetrics while abroad, he ushered a few babies into the world and so increased his pediatric practice. He also rectified a poor job of surgery on the tail of a dog that was to be entered in a dog show, set some bones and stitched up some cuts for another one and did an autopsy on a canary after having failed to cure it; he found peritonitis. Soon, by a process of elimination, he was able to restrict his work to children, his aim from the start in spite of the warnings of all his colleagues. Work in clinics, hospitals and laboratories and at a couple of municipal jobs added to his practice, kept him fully occupied and on his toes. If genius is measured by a man's ability to work, as some one said, Dr. Abt has a claim to that title. He was, and still is, an indefatigable worker.

Dr. Abt's career in pediatrics and the development of that specialty ran a nearly parallel course from the beginning and for well over fifty years. They grew up together, and each helped the other. It is this that adds significance to the book, giving it a twofold interest and purpose. On the one hand, it is the autobiography, the intimate personal narrative of the trials as well as the rewards, of a physician whose life was devoted to the care of children in the widest sense, both as a pioneer in and as one of the foremost exponents of pediatrics in this country. On the other hand, it traces the development of pediatrics from its infancy, step by step, as new procedures and discoveries changed its course, up to its present full maturity, as Dr. Abt himself lived through and helped in the development.

The book is written clearly and simply, as are all good books, and the layman need have no fear that it is beyond his depth. Nearly every step in the progress of care of children is illustrated by an anecdote, the story of a case or of a medical or social situation, and

through it all runs an irrepressible and genial humor and a refreshingly human interest that never forgets the child himself.

To physicians of only a little later vintage the book has an especial appeal; to younger physicians it should be both interesting and stimulating. Laymen, the parents, will find the book interesting and informative, both because it portrays a long and outstanding professional career and because it will make them realize why their children can now be so well guarded and cared for. This is a "doctor book" that ought to have a wide field of human interest and usefulness.

The War and Mental Health in England. By James M. Mackintosh, M.D. Price, 85 cents. Pp. 91, with no illustrations. New York: The Commonwealth Fund, 1944.

Dr. Mackintosh is professor of preventive medicine at the University of Glasgow. He has long been interested in mental health and has identified himself with the groups which are doing work in that field. Part I deals with the impact of war; part II, with mobilization for peace.

During the "process of adjustment" (1939-1940) there was an increase in mental stress due to mobilization and evacuation. Rapid social changes, stress brought about by uncertainties, breaking up of homes, placing of men in new positions to which many could not adjust, increased strain from long hours, unhealthy conditions brought on by blackouts, lack of recreation, shortage of food and favoritism brought on a sharp increase in severe attacks of illness, notably of rheumatism and ulcers. The anxiety of adults was passed on to children. Evacuation, though efficiently done except that human elements were omitted, was harmful to the minds of children. There was a letdown in discipline; children suffered from being placed with persons of different social classes. Easing of anxiety followed the confirmation that "Now we are at it," and much has been done to overcome the mental stresses that were at first overlooked.

The fall of France was so rapid that progressive mental adjustment was out of the question. Churchill's speeches (1940-1941) and the evacuation of Dunkirk restored the national balance of mind, and the battle of Britain brought back the full measure of public confidence. The people of Great Britain and the United States have a mental advantage in that they feel they cannot be defeated.

In 1941 and 1942 the attack on Russia gave the British an opportunity to enter the offensive phase of the war and to plan for the future. These changes greatly improved their mental health as did an improved system for distribution of food.

In 1943 the mental attitude of the English people improved rapidly with the victories at Stalingrad and in Egypt. By this time children in England were permanently placed for the duration. The effects of the placement on the adjustments to be made at the end of the war are discussed.

Psychiatric hospitals and facilities for child guidance are increasing, and the rehabilitation of children and adults after the war is receiving special consideration. Both governmental and volunteer organizations are engaged in this work. The author points out the need for further teaching of psychiatry in medical schools.

This book contains a large amount of extremely interesting and valuable information on the effect of war on mental health and on the conditions that affect mental health, only a small percentage of which can be introduced in a review. It should provide equally profitable reading for professional and for nonprofessional persons.

Functional Disorders of the Foot. By Frank D. Dickson, M.D., and Rex L. Diveley, M.D. Second edition. Price, $5.00. Pp. 352, with 202 illustrations. Philadelphia: J. B. Lippincott Company, 1944.

This is a highly practical treatise on a subject which should be of great interest to the pediatrician and to the general practitioner as well as to the orthopedic surgeon.

It is unfortunate that the medical profession as a whole has not recognized the great amount of disability and discomfort produced by functional and anatomic disorders of the foot and has failed, therefore, to give these conditions the serious study and attention they deserve. Symptom-producing conditions of the foot constitute a real economic as well as a medical problem.

The chapters on the evolutionary development of the foot, on anatomy and physiology and on the primary causes of imbalance of the foot are elementary, but they represent fundamental knowledge which must be assimilated before accurate diagnosis and adequate treatment are possible.

The authors point out, correctly, that the early recognition and treatment of functional imbalance of the foot in early childhood, when the bones of the feet are in the process of calcification and growth, may result in an anatomic and physiologic cure. In the adult, however, such is usually not the case, and treatment is palliative and designed to relieve symptoms only. The pediatrician, therefore, is probably in a position to do more for the prevention of foot trouble than any one else in the medical profession.

The discussion of the McElvenny and Betts surgical procedure in the treatment of metatarsalgia is most interesting. I am sure that this operation will have a definite place.

The chapter on foot apparel is good, although there is undoubtedly room for a difference of opinion as to some of the characteristics of a "good" shoe.

The book is provided with drawings of methods of foot and ankle strapping and with pictures illustrating foot exercises.

Soviet Health Care in Peace and War. By Rose Maurer. Price, 10 cents. Pp. 48, with 5 illustrations. New York: American Russian Institute, 1943.

The author speaks from first hand contact with the medical institutions and practices of Soviet Russia, and since leaving that country she has kept in close touch with medical progress through reports and other literature. The first part of the book describes the health administration in times of peace and the second part the adaptation to the needs of war. The government holds itself directly responsible for the provision of health facilities and education in matters of health. The citizen is held responsible for availing himself of these opportunities. Protection of health at the place of work is facilitated through the cooperation of the trade unions. District health centers are numerous, and special provisions are made for the care of women and children and for rural medical facilities. Medical education is free, and the majority of students receive also an allowance for expenses. In return, graduates are expected to practice for five years in the locality in which the Health Commissariat decides their services are most needed. At the beginning of the war there

was a reduction in the medical curriculum, but this has been found inadvisable; now the full five year course is again operative. The splendid cooperation between civilian, military forces and medical workers is shown to be a large factor in the remarkable record of achievement in health. Individual responsibility for the welfare of all seems to be the motivating spirit. Before the war Soviet Russia had experienced a 40 per cent reduction in death rate in comparison with tsarist Russia. The death rates in Moscow and Leningrad were lower than those in Berlin, London or Paris. The lack of epidemics since the beginning of the war speaks for the health and the health organization of the civilian population and of the army. It is said also that the red army and air forces are virtually free from venereal disease.

Elements of Medical Mycology. By Jacob Hyams Swartz, M.D. Price, $4.50. Pp. 190, with 80 illustrations. New York: Grune & Stratton, Inc., 1943.

This is an excellent small book which fulfils its avowed purpose as stated in the preface, "to serve the practitioner as a guide to the study of fungus diseases." It is also admirably suited to the student and to the practitioner who does not profess to be a mycologist. It is not at all an encyclopedic reference, and to the experienced mycologist it is only a primer.

The great merit of the book is its conciseness and simplicity. Outlines are excellent. Terminology is clarified and simplified and so illustrated as to eliminate much of the confusion that confronts the student or practitioner to whom fungous diseases are of only part time interest.

The clinical descriptions are a bit too brief, but the details are of course available elsewhere. The illustrations of clinical features of the diseases are too few and not particularly good; however, both the photographs and the drawings of direct preparations are most adequate. The information to be obtained from such simple procedures is given major space, as against the more difficult and highly specialized cultural studies. This emphasis is gratifying to the practitioner who lacks the facilities for complicated cultural studies.

Therapy, which is so important to the practitioner, is well covered in detail. Evaluation of questionable modalities is especially sane and helpful. This as well as other phases is up-to-date and is no mere rehash of other published works. The closing chapter is entitled "Sulfanilamide and its Derivatives: Effect on Fungi."

The glossary of terms encountered in mycology is adequate and helpful. The indexing is good. The outlines, both in the text and in the appended chart, are excellent both for teaching and for ready understanding of the field.

Psychology of Women. Volume I. By Helene Deutsch, M.D. Price, $4.50. Pp. 399. New York: Grune & Stratton, Inc., 1944.

The author of this book has devoted many years to the study of feminine psychology. In this volume she presents a systematic study of the development of the personality of woman, using her own observations and those of other writers. Since over 200 pages is devoted to adolescence and the preceding years, it is of special interest to pediatricians.

Chapters devoted to prepuberty, early puberty, puberty, adolescence and menstruation are followed by chapters on the mature personality of women. The author carefully describes the instinctive and environmental factors which consciously and unconsciously influence the minds of girls and women and considers the large number of conflicting emotional problems which enter their minds. Normal growth and development are described, and the causes of mental ill health are discussed at length. Throughout the book the author emphasizes the fact that there are many emotional problems, usually conflicting ones, in the mind of every girl. If those problems become too complex and she cannot solve them, neuroses and other forms of mental ill health develop; these conditions can often be remedied by psychiatric treatment.

The author is a psychoanalyst and follows the freudian approach to behavior. Her work has been largely with adults, but she has treated a great many girls. Although she has not worked directly with infants and children, except in "working back" with her patients, she has grasped and described the attitudes of parents which influence children.

The book is detailed, and well written and reveals a rare insight into the emotional development of women. It should be very helpful to pediatricians, even though the psychiatric nomenclature may make parts of the book rather difficult reading.

Something New About Health and Healing. By P. F. Van Den Daele, B.S. Price, $3.00. Pp. 288. Boston: The Christopher Publishing House, 1944.

This collection of essays and notes is a unique combination of misinformation and much honest intent. The author is a bloodless surgeon, relying for diagnosis on the history and palpation and for treatment chiefly on manipulation and application of heat when the local temperature is low and of cold when the local temperature is elevated. He denies that germs can cause disease, deplores the use of serums and vaccines and explains the processes of disease as due to short-circuiting of nervous impulses.

In spite of these misconceptions, much of the advice about the nursing care of the patient and about diet is sound. Also his criticism of the too common practice of using drugs to overcome symptoms instead of searching for the underlying cause is not amiss.

News and Comment

PERSONAL NEWS

Promotion for Col. James G. Hughes.—Col. James G. Hughes, Medical Corps, Army of the United States, formerly of Memphis, Tenn., at 34 years of age has been promoted from lieutenant-colonel, becoming one of the youngest Medical Corps colonels in the Italian theater.

New Appointment for Dr. R. R. Struthers.—Dr. R. R. Struthers, professor of pediatrics at McGill University, Montreal, Canada, and physician-in-chief at the Children's Memorial Hospital, has accepted a position as pediatric consultant with the United Nations Reconstruction and Rehabilitation Administration. Dr. Alton Goldbloom has been appointed chairman of the department of pediatrics and acting physician-in-chief to the Children's Memorial Hospital.

Directory of Pediatric Societies *

INTERNATIONAL

International Association of Preventive Pediatrics

President: Prof. S. Monrad, Dronning Louises Børnehospital, Copenhagen, Denmark.
Secretary: Dr. Daniel Oltramare, 15 Rue Lévrier, Geneva, Switzerland.

International Congress of Pediatrics

President: Dr. Henry F. Helmholz, Mayo Clinic, Rochester, Minn.
Secretary-Treasurer: Dr. Charles F. McKhann, University Hospital, Ann Arbor, Mich.
Canadian Committee:
Chairman: Dr. Alan Brown, Hospital for Sick Children, 67 College St., Toronto.
Secretary: Dr. H. P. Wright, 1509 Sherbrooke St. W., Montreal.
Place: Boston. Time: Postponed indefinitely.

International Congress for the Protection of Infancy

Secretary: Prof. G. B. Allaria, Corso Bramante 29, Torino 120, Italy.

FOREIGN

Argentine Pediatric Society of Buenos Aires

President: Dr. Martin Ramón Arana, 1809 Rodriguez Peña, Buenos Aires.
General Secretary: Dr. Alfredo Larguia, Cerrito 1179, Buenos Aires.

Associação Paulista de Medicina, Section on Pediatrics

President: Dr. Vicente Lara.
First Secretary: Dr. Armando de Arruda Sampaio.
Second Secretary: Dr. Paulo de Barros Franca, Av. Brigadeiro Luiz Antonio 393, 1° Andar, São Paulo, Brazil.

British Paediatric Association

President: Prof. L. G. Parsons, 58 Calthorpe Rd., Five Ways, Birmingham.
Secretary: Dr. Donald Paterson, 27 Devonshire Pl., London, W. 1.

Danish Pediatric Society

President: Dr. E. Lenstrup, Copenhagen.
Secretary: Dr. E. Gjørup, Dronning Louises Børnehospital, Copenhagen.

Nederlandische Vereeniging voor Kindergeneeskunde

President: Dr. J. H. G. Carstens, Servaasbolwerk 14ª, Utrecht.
Secretary: Dr. R. P. van de Kasteele, Laan van Poot 340, 's Gravenhage.
Place: Different places. Time: Three times a year.

Paediatrický Spolok na Slovensku

President: Dr. A. J. C. Chura, Lazaretská 11, Bratislava.
Secretary: Dr. P. Rados, Lazaretská 6, Bratislava.
Place: Pediatric Clinic, University Bratislava. Time: Six times a year.

Royal Society of Medicine, Section for the Study of Disease in Children

President: Dr. E. A. Cockayne, 98 Harley St., Lond W. 1, England.
Secretary: Dr. R. Lightwood, 86 Brook St., Lond W. 1, England.
Place: 1 Wimpole St., London. Time: Fourth Fri of each month, 4:15 p. m.

Palestine Jewish Medical Association, Section of Physicians of Children's Diseases

President: Prof. S. Rosenbaum, 26 Bialkstr., Tel Av
Secretary: Dr. A. Brünn, 9 Maazestre, Tel Aviv.

Sociedad Cubana de Pediatria

President: Dr. Angel A. Aballí Arellano, 17 No. Vedado, Habana.
Secretary: Dr. Julio G. Cabrera Calderin, Hospi Mercedes L y 21 (Vedado), Box 2430, Habana.
Place: Cátedra de Clinica Infantil, Hospital Merced Habana. Time: Last Wednesday of every month.

Sociedad Mexicana de Pediatria

President: Dr. Fernando López Clares, 12/a. Medel 191, Mexico.
Secretary: Dr. Jesus Gómez Pagola, Versalles Mexico.

Sociedad Venezolana de Puericultura y Pediatr

President: Dr. E. Santos Mendoza.
Secretary: Dr. P. Oropeza, Hospital de Niños, Caraca

Société de Pédiatrie de Paris

President: Dr. B. Weill-Hallé, 49 Avenue Raymo Poincare, Paris, France.
Secretary: Dr. Jean Hallé, 10 bis Rue Pré aux Cler Paris, France.
Place: Hôpital des Enfants Malades, 49 Rue de Sèvr Time: 4:30 p. m., third Thursday of every month.

Uruguyan Society of Pediatrics

President: Dr. Jose Alberto Praderi, Eduardo Acev 1132, Montevideo.
Secretary: Dr. Alfredo Ramon Guerra, Paysandú 8 Montevideo.

NATIONAL

American Medical Association, Scientific Assembly, Section on Pediatrics

Chairman: Dr. John Aikman, 184 Alexander S Rochester, N. Y.
Secretary: Dr. Gilbert J. Levy, 188 S. Bellevue Blv Memphis, Tenn.
Place: New York. Time: June 11-15, 1945.

American Academy of Pediatrics

President: Dr. Franklin P. Gengenbach, 1850 Gilp St., Denver, Colo.
Secretary: Dr. Clifford G. Grulee, 636 Church S Evanston, Ill.

* Secretaries of societies are requested to furnish the information necessary to make this list complete and to keep it up to date.

American Hospital Association, Children's Hospital Section

Chairman: Dr. Joelle C. Hiebert, 299 Main St., Lewiston, Maine.
Secretary: Dr. W. Franklin Wood, McLean Hospital, Waverly, Mass.

American Pediatric Society

President: Dr. James L. Gamble, 300 Longwood Ave., Boston.
Secretary-Treasurer: Dr. Hugh McCulloch, 325 N. Euclid Ave., St. Louis.

Canadian Society for the Study of Diseases of Children

President: Dr. R. R. Struthers, 906 Drummond Medical Bldg., Montreal.
Secretary-Treasurer: Dr. Elizabeth Chant Robertson, Hospital for Sick Children, Toronto.

Society for Pediatric Research

President: Dr. Edward M. Bridge, 219 Bryant St., Buffalo, N. Y.
Secretary: Dr. Mitchell I. Rubin, 1740 Bainbridge St., Philadelphia 46.

SECTIONAL

Intermountain Pediatric Society

President: Dr. Eugene Smith, 385-24th St., Ogden, Utah.
Secretary-Treasurer: Dr. W. C. Cheney, 837 Boston Bldg., Salt Lake City.
Place: Salt Lake City General Hospital. Time: First Thursday of each month, 8 p. m.

New England Pediatric Society

President: Dr. Warren R. Sisson, 319 Longwood Ave., Boston.
Secretary-Treasurer: Dr. James Marvin Baty, 1101 Beacon St., Brookline, Mass.
Place: Boston Medical Library. Time: Four meetings a year, occurring from September to May.

North Pacific Pediatric Society

President: Dr. M. L. Bridgeman, 1020 S. W. Taylor St., Portland, Ore.
Secretary: Dr. C. G. Ashley, 833 S. W. 11th Ave., Portland, Ore.

Northwestern Pediatric Society

President: Dr. Arild E. Hansen, University of Minnesota, Minneapolis.
Secretary-Treasurer: Dr. Albert V. Stoesser, 205 W. University Hospital, Minneapolis.
Place: Minneapolis, St. Paul, Duluth and Rochester. Time: January, April, July and October.

Rocky Mountain Pediatric Society

President: Dr. G. R. Fisher, 23 E. Pikes Peak Ave., Colorado Springs, Colo.
Secretary: Dr. Joseph H. Lyday, 1850 Gilpin St., Denver.

Southern Medical Association, Section of Pediatrics

Chairman: Dr. William Weston Jr., 1428 Lady St., Columbia, S. C.
Secretary. Dr. Angus McBryde 604 W. Chapel Hill St., Durham, N. C.

STATE

Alabama Pediatric Society

President: Dr. Amas Gipson, 948 Forrest Ave., Gadsen.
Secretary-Treasurer: Dr. Ruth Berrey, 2021-6th Ave. N., Birmingham.

Arizona Pediatric Society

President: Dr. Vivian Tappan, San Clemente, Tucson.
Secretary: Dr. Hilda Kroeger, Arizona State Health Dept. (Maternal and Child Welfare Division), Phoenix.

Arkansas State Pediatric Association

Chairman: Dr. C. B. Billingsley, 1425 N. 11th St., Fort Smith.
Secretary: Dr. R. E. Weddington, 1425 N. 11th St., Fort Smith.

California State Medical Society, Section on Pediatrics

Chairman: Dr. William C. Deamer, University of California Hospital, San Francisco.
Secretary: Dr. Charles W. Leach, 2000 Van Ness Ave., San Francisco.

Florida State Pediatric Society

President: Dr. Ludo Von Meysenbug, Box 3356, Daytona Beach.
Secretary: Dr. Robert Blessing, 409 Blount Bldg., Ft. Lauderdale.
Place: Concurrent with state association meeting at time of convention.

Georgia Pediatric Society

President: Dr. T. F. Davenport, 104 Ponce de Leon Ave. N. E., Atlanta.
Secretary-Treasurer: Dr. Don F. Cathcart, 478 Peachtree St. N. E., Atlanta.

Hezekiah Beardsley Pediatric Club of Connecticut

President: Dr. Edward T. Wakeman, 129 Whitney Ave., New Haven.
Secretary: Dr. Herman Yannet, Southbury Training School, Southbury.
Time: Three meetings a year.

Illinois State Medical Society, Section on Pediatrics

Chairman: Dr. Craig D. Butler, 715 Lake St., Oak Park.
Secretary: Dr. A. J. Fletcher, 139 N. Vermilion, Danville.

Indiana State Pediatric Society

President: Dr. K. T. Knode, 1105 E. Jefferson Bldg., South Bend.
Secretary-Treasurer: Dr. Mathew Winters, 621 Hume Mansur Bldg., Indianapolis.
Time: Two meetings a year.

Iowa Pediatric Society

President: Dr. Mark L. Floyd, Children's Hospital, Iowa City.
Secretary-Treasurer: Dr. James Dunn, Davenport Bank Bldg., Davenport.

MEDICAL SOCIETY OF STATE OF NEW YORK, SECTION ON PEDIATRICS

Chairman: Dr. A. Clement Silverman, 608 E. Genesee St., Syracuse.
Secretary: Dr. Albert G. Davis, 307 Gas and Electric Bldg., Utica.

MEDICAL SOCIETY OF THE STATE OF PENNSYLVANIA, PEDIATRIC SECTION

Chairman: Dr. Elwood W. Stitzel, 403 Central Trust Bldg., Altoona, Pa.
Secretary: Dr. P. F. Lucchesi, Philadelphia Hospital, Philadelphia.

MICHIGAN STATE MEDICAL SOCIETY, PEDIATRIC SECTION

Chairman: Dr. Charles F. McKhann, University Hospital, Ann Arbor.
Secretary: Dr. Mark F. Osterlin, Central Michigan Children's Clinic, Traverse City.

MISSISSIPPI STATE PEDIATRIC SOCIETY

President: Dr. Harvey F. Garrison Jr., 315 E. Capitol Pl., Jackson.
Secretary: Dr. Guy Verner, 126 N. Congress St., Jackson.

NEBRASKA PEDIATRIC SOCIETY

President: Dr. E. W. Hancock, 820 Sharp Bldg., Lincoln.
Secretary-Treasurer: Dr. John M. Thomas, 1102 Medical Arts Bldg., Omaha.
Place: As announced by committee. Time: Third Thursday of each month from October to June, inclusive. Dinner at 6 p. m.

NEW HAMPSHIRE PEDIATRIC SOCIETY

President: Dr. MacLean J. Gill, 14 N. State St., Concord.
Secretary-Treasurer: Dr. Ursula G. Sanders, 46 Pleasant St., Concord.
Time: Twice yearly.

NORTH CAROLINA PEDIATRIC SOCIETY

President: Dr. Arthur H. London, 1105 W. Main St., Durham.
Secretary: Dr. Jay M. Arena, 604 W. Chapel Hill St., Durham.

OKLAHOMA STATE PEDIATRIC SOCIETY

President: Dr. Ben H. Nicholson, 301 N. W. 12th St., Oklahoma City.
Secretary: Dr. Luvern Hays, 108 W. 6th St., Tulsa.
Place: Oklahoma Club. Time: 6:30 p. m., fourth Friday of each alternate month from September to May, inclusive.

SOUTH CAROLINA PEDIATRIC SOCIETY

President: Dr. Lonita Boggs, 301 E. Coffee St., Greenville.
Secretary-Treasurer: Dr. Hilla Sheriff, Wade Hampton Office Bldg., Columbia.

TEXAS PEDIATRIC SOCIETY

President: Dr. F. H. Lancaster, 4409 Fannin St., Houston.
Secretary-Treasurer: Dr. John E. Ashby, 3610 Fairmount Ave., Dallas.

VIRGINIA PEDIATRIC SOCIETY

President: Dr. Edwin A. Harper, 301 Rivermont Ave., Lynchburg.
Secretary: Dr. Emily Gardner, 1100 W. Franklin St., Richmond.

WEST VIRGINIA STATE MEDICAL SOCIETY, SECTION ON PEDIATRICS

President: Dr. Andrew Amick, 1021 Quarrier [St.], Charleston.
Secretary: Dr. A. A. Shawkey, Professional [Bldg.], Charleston.

LOCAL

ACADEMY OF MEDICINE OF CLEVELAND PEDIATRIC SECTION

Chairman: Dr. J. D. Nourse, 10515 Carnegie [Ave.], Cleveland.
Secretary: Dr. I. B. Silber, 10465 Carnegie [Ave.], Cleveland.
Place: Cleveland Medical Library Bldg. Time: [Oc]tober, December, February and April.

ACADEMY OF MEDICINE, TORONTO, SECTION OF PEDIATRICS

President: Dr. I. Nelles Silverthorne, 170 St. [George] St., Toronto, Canada.
Secretary: Dr. G. P. Hamblin, 2333 Bloor St. [W.], Toronto, Canada.

BRONX PEDIATRIC SOCIETY

President: Dr. Harry J. Cohen, 1975 Walton [Ave.], New York.
Secretary: Dr. Walter Levy, 12 E. 88th St., New [York].
Place: Concourse Plaza Hotel, 161st St., and [Grand] Concourse. Time: Second Wednesday of each [month] except June, July, August and September.

BROOKLYN ACADEMY OF PEDIATRICS

President: Dr. Harry A. Naumer, 37–8th [Ave.], Brooklyn.
Secretary: Dr. Lewis A. Koch, 62 Pierrepont [St.], Brooklyn.
Place: Granada Hotel. Time: Fourth Wednesday [of] October, November, February, March and April.

BUFFALO PEDIATRIC SOCIETY

President: Dr. A. Wilmot Jacobsen, 187 Bryant [St.], Buffalo N. Y.
Secretary: Dr. Richard A. Downey, 786 Forest [Ave.], Buffalo, N. Y.
Place: Children's Hospital, 219 Bryant St. Time: 8 [p.] m., first Monday of each month from Septem[ber] to June.

CENTRAL NEW YORK PEDIATRIC CLUB

President: Dr. Edward J. Wynkoop, 501 James [St.], Syracuse.
Secretary: Dr. Frank J. Williams, 58 S. Swan [St.], Albany.
Places:: Various cities in New York. Time: Th[e] Tuesday of April and September.

CHICAGO PEDIATRIC SOCIETY

President: Dr. Morley D. McNeal, 2 N. Sheridan [Rd.], Highland Park, Ill.
Secretary: Dr. Henry G. Poncher, 1819 W. Polk [St.], Chicago.
Place: Children's Memorial Hospital, 710 Fuller[ton] Ave. Time: Third Tuesday of each month, Octo[ber] to May, Inclusive.

Cincinnati Pediatric Society

retary: Dr. T. Selkirk, 3530 Reading Rd., Cincinnati.
e: Children's Hospital, Elland Ave., Cincinnati.
me: On call.
ident: Dr. Lloyd K. Felter, 3144 Jefferson Ave., Cincinnati.

Dallas Pediatric Society

ident: Dr. John E. Ashby, 3610 Fairmount Ave., allas, Texas.
retary-Treasurer: Dr. Gladys J. Fashena, 4585 Bel-rt, Dallas, Texas.
e: Bradford Baby Hospital. Time: 1 p. m., second d fourth Saturdays of each month.

Detroit Pediatric Society

sident: Dr. John J. Pollack, 650 Maccabees Bldg., etroit, Mich.
retary: Dr. Philip J. Howard, 2799 W. Grand Blvd., Detroit, Mich.
e: Wayne County Medical Society. Time: 8:30 m., first Wednesday of each month from October June, inclusive.

Fulton County Medical Society, Pediatrics Section (Atlanta, Ga.)

irman: Dr. Don F. Cathcart, 478 Peachtree St. N. E., Atlanta.
retary: Dr. Harry Lange, 478 Peachtree St., N. E., tlanta.
e: Academy of Medicine, 38 Prescott St. N. E. ime: Second Thursday of each month from October April, 8 p. m.

Houston Pediatric Society

sident: Dr. Raymond Cohen, 2300 Caroline St., Houston, Texas.
retary: Dr. Betty Moody, 526 Richmond Rd., Houston, Texas.
e: College Inn, Houston. Time: Fourth Monday f each month.

Kansas City (Missouri) Pediatric Society

sident: Dr. Edwin H. Schorer, 1103 Grand Ave., Kansas City.
retary: Dr. H. E. Petersen, Kirkpatrick Bldg., St. oseph, Mo.
e: Kansas City General Hospital. Time: On call.

Los Angeles County Medical Association, Pediatric Section

sident: Dr. Oscar Reiss, 2200 W. 3d St., Los Angeles.
retary-Treasurer: Dr. Elena Boder, 1830½ Lucille Ave., Los Angeles.
e: Los Angeles County Medical Headquarters, 1925 Wilshire Blvd. Time: Second Monday of February, April, June, October and December.

Medical Society of the County of Kings and the Academy of Medicine of Brooklyn, Pediatric Section

sident: Dr. Abraham M. Litvak, 1145 Eastern Park-way, Brooklyn.
retary: Dr. Harold Levy, 750 St. Marks Ave., Brooklyn.
e: 1313 Bedford Ave., Brooklyn. Time: 9:00 p. m., ourth Monday of each month, October to April, nclusive.

Medical Society of the County of Queens, Inc., Section on Pediatrics

Chairman: Dr. Meyeron Coe, 217-02-91st Ave., Queens Village, N. Y.
Secretary-Treasurer: Dr. Edith A. Mittell, 144-38th Ave., Flushing, N. Y.
Place: Queens County Medical Bldg., Forest Hills, N. Y. Time: Third Monday of October, January, March and May.

Medical Society of the District of Columbia, Section on Pediatrics

President: Dr. Harry A. Spigel, 2647 Connecticut Ave., Washington, D. C.
Secretary-Treasurer: Dr. Perry W. Gard, 2520 Woodley Rd., Washington, D. C.
Place: Medical Society Bldg., 1718 M St. N. W. Time: 8 p. m., fourth Thursday of every month.

Memphis Pediatric Society

President: Dr. F. T. Mitchell, 376 S. Bellevue Ave., Memphis, Tenn.
Secretary-Treasurer: Dr. Harry Jacobson, 1193 Madison Ave., Memphis, Tenn.
Place: John Gaston Hospital. Time: Quarterly.

Milwaukee Pediatric Society

President: Dr. John H. Reynolds, 1628 W. Wisconsin Ave., Milwaukee.
Secretary-Treasurer: Dr. F. J. Mellencamp, 324 E. Wisconsin Ave., Milwaukee.
Place: Milwaukee Athletic Club. Time: Second Wednesday of each alternate month, beginning with February.

New York Academy of Medicine, Section of Pediatrics

Chairman: Dr. Howard Craig, 175 E. 79th St., New York.
Secretary: Dr. Alfred E. Fischer, 73 E. 90th St., New York.
Place: New York Academy of Medicine, 2 E. 103d St. Time: Second Thursday of each month from October to May, inclusive, 8:30 p. m.

Northern California Affiliates

President: Dr. Crawford Bost, 400 Post St., San Francisco.
Secretary: Dr. William A. Reilly, 384 Post St., San Francisco.
Time: Second Thursday of September, November, January, March and May.

Oklahoma City Pediatric Society

President: Dr. William M. Taylor, 1200 N. Walker St., Oklahoma City.
Secretary: Dr. G. R. Felts, 625 N. W. 10th St., Oklahoma City.
Place: Oklahoma Club. Time: Third Thursday of each month.

Philadelphia Pediatric Society

President: Dr. Carl Fischer, Greene and Coulter Sts., Germantown, Philadelphia.
Secretary: Dr. Sherman Little, 1740 Bainbridge St., Philadelphia.
Place: College of Physicians, 19 S. 22d St. Time: Second Tuesday in January, March, May and November.

Pittsburgh Pediatric Society

President: Dr. John D. Sturgeon Jr., 22 N. Gallatin Ave., Uniontown, Pa.

Secretary-Treasurer: Dr. C. J. Stoecklein, Medical Arts Bldg., Pittsburgh.

Place: Pittsburgh Academy of Medicine. Time: Second Friday, alternate month from October to June, inclusive.

Richmond Pediatric Society

President: Dr. Stanley Meade, 913 Floyd Ave., Richmond, Va.

Secretary-Treasurer: Dr. Louise Galvin, 214 S. Boulevard, Richmond, Va.

Place: Richmond Academy of Medicine, 1200 E. Clay St. Time: 8 p. m., third Thursday of each month, except June, July and August.

Rochester Pediatric Society

President: Dr. Herbert Soule, 122 Rutgers St., Rochester, N. Y.

Secretary-Treasurer: Dr. Jerome Glaser, 300 S. Goodman St., Rochester, N. Y.

Place: Rochester Academy of Medicine or arrangement by program committee. Time: Third Friday of each month from October to May.

St. Louis Pediatric Society

President: Dr. Jerome Diamond, 508 N. Grand Ave., St. Louis.

Secretary-Treasurer: Dr. Mary A. McLoon, 408 Humboldt Bldg., St. Louis.

Place: St. Louis Medical Society Bldg. Time: First Friday of each month from November to June.

Seattle Pediatric Society

President: Dr. Frederick B. Joy, Stimson Bldg., Se

Secretary: Dr. Sherod M. Billington, Medical D Bldg., Seattle.

Place: College Club. Time: Third Friday of month from September to June at 6:30 p. m.

Southwestern Pediatric Society

President: Dr. Jeanette Harrison, 1136 W. 6th Los Angeles.

Secretary: Dr. Henry F. Gallagher, 1930 Wil Blvd., Los Angeles.

Place: Jonathan Club of Los Angeles. Time: F Wednesday in January, March, May, September November.

University of Michigan Pediatric and Infectious Disease Society

President: Dr. Campbell Harvey, 35 W. Huron Pontiac, Mich.

Secretary: Dr. Harry A. Towsley, University of M igan, Department of Pediatrics and Communic Diseases, Ann Arbor, Mich.

Westchester County Medical Society, Pediatric Section (New York)

President: Dr. John B. Ahouse, 27 Ludlow St., Yonk N. Y.

Secretary-Treasurer: Dr. Elvira Ostlund, 64 High Rd., Rye, N. Y.

Place: Grasslands Hospital, Valhalla, N. Y. Ti Third Thursday in October, December, February April.